

 ICOM

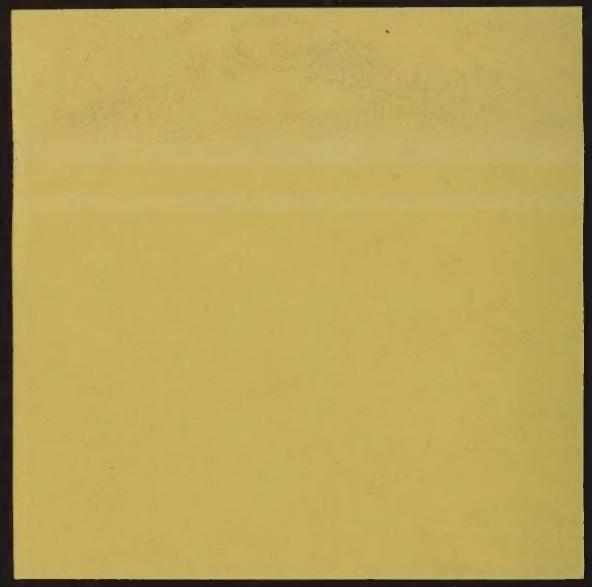
SERVICE MANUAL

DUAL BAND FM TRANSCEIVER

IC-32A
IC-32AT
IC-32E

BP-8

5/8" x 1 7/8"



INTRODUCTION

This service manual describes the latest service information for the **IC-32A/AT/E DUAL BAND FM TRANSCEIVER** at the time of going to press.

Six versions of the **IC-32A/AT/E** have been designed. This service manual covers each version.

| VERSION NO. | VERSION | FREQUENCY RANGE [MHz] | | TUNING STEP [kHz] | | INITIAL OFFSET [MHz] | | ENCODERS |
|-------------|--------------------|-----------------------|---------|-------------------|-----|----------------------|-----|------------|
| | | VHF | UHF | VHF | UHF | VHF | UHF | |
| #03 | Europe (IC-32E) | 144~146 | 430~440 | 25 | 25 | 0.6 | 7.6 | Tone call |
| #04 | Italy (IC-32E) | 144~148 | 430~440 | 25 | 25 | 0.6 | 7.6 | Tone call |
| #05 | U.S.A. (IC-32AT) | 144~148 | 440~450 | 15 | 25 | 0.6 | 5.0 | CTCSS/DTMF |
| #06 | U.S.A. (IC-32A) | 144~148 | 440~450 | 15 | 25 | 0.6 | 5.0 | — |
| #07 | Australia (IC-32A) | 144~148 | 430~440 | 25 | 25 | 0.6 | 5.0 | — |
| #09 | Asia (IC-32AT) | 144~148 | 430~440 | 15 | 25 | 0.6 | 5.0 | CTCSS/DTMF |

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.

REPAIR NOTE

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from a power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 30 dB~40 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.



The picture shows the IC-32AT.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. Component part number and name
2. Equipment model name and unit name
3. 10-digit order numbers for mechanical parts
4. Quantity required

<SAMPLE ORDER>

| | | | | | |
|-------|-----------------|--------|-------------|------------|----------|
| IC | μPD4094BG | IC-32A | MAIN UNIT | — | 2 pieces |
| Screw | PH BO 2×31.5 ZK | IC-32E | Front panel | 8810004000 | 4 pieces |

Addresses are provided on the inside back cover for your convenience.

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SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency coverage

| VERSION | GUARANTEED RANGE | | OPERATIONAL RANGE | |
|----------------------------|------------------------------------|------------------------------------|------------------------------------|-------------|
| | TRANSCIEVER | RECEIVER | RECEIVER | TRANSMITTER |
| IC-32A/AT (U.S.A. version) | 144.00 ~ 148.00 440.00 ~ 450.00 | 138.00 ~ 174.00 440.00 ~ 450.00 | 140.00 ~ 150.00 440.00 ~ 450.00 | |
| IC-32A (Australia version) | 144.00 ~ 148.00 430.00 ~ 440.00 | 144.00 ~ 148.00 430.00 ~ 440.00 | 144.00 ~ 148.00 430.00 ~ 440.00 | |
| IC-32AT (Asia version) | 144.00 ~ 148.00 430.00 ~ 440.00 | 138.00 ~ 174.00 430.00 ~ 440.00 | 140.00 ~ 150.00 430.00 ~ 440.00 | |
| IC-32E (Europe version) | 144.00 ~ 146.00 430.00 ~ 440.00 | 144.00 ~ 146.00 430.00 ~ 440.00 | 144.00 ~ 146.00 430.00 ~ 440.00 | |
| IC-32E (Italy version) | 144.00 ~ 148.00 430.00 ~ 440.00 | 138.00 ~ 174.00 430.00 ~ 440.00 | 140.00 ~ 150.00 430.00 ~ 440.00 | |

(Unit: MHz)

- Mode
- Tuning step increment

F3 (FM)

| | |
|-----------|--------------------------|
| IC-32A/AT | 5, 10, 15, 20, or 25 kHz |
| IC-32E | 12.5 or 25 kHz |

- Antenna impedance
- Power supply requirement
- Current drain (at 13.2 V DC)

• 50 Ω unbalanced

• 5.5 ~ 16.0 V DC (from the bottom terminal)

12.0 ~ 16.0 V DC (from [DC IN 13.8 V] jack)

| TX/RX | DESCRIPTION | VHF | UHF |
|----------|-------------------|---------------------|--------|
| | | Power saved typical | 10 mA |
| Receive | Max. audio output | 250 mA | 250 mA |
| | HIGH power | 2.0 A | 2.2 A |
| Transmit | LOW power | 900 mA | 1.0 A |
| | | | |

- Usable temperature range
- Frequency stability
- Dimensions and weight

• -10°C ~ +60°C (+14°F ~ +140°F)

• ±10 ppm (-10°C ~ +60°C, +14°F ~ +140°F)

| ATTACHED BATTERY PACK | DIMENSIONS Unit: mm (in) | | | WEIGHT Unit: g (lb) |
|-----------------------------|--------------------------|-------------|----------|---------------------|
| | W | H | D | |
| With BP-70 (U.S.A. version) | 65 (2.6) | 180.5 (7.1) | 35 (1.4) | 590 (1.3) |
| With BP-4 (Asia version) | 65 (2.6) | 169.0 (6.7) | 35 (1.4) | 545 (1.2) |
| With BP-3 (Other versions) | 65 (2.6) | 159.0 (6.3) | 35 (1.4) | 510 (1.1) |

■ TRANSMITTER

- Output power

| | VHF | UHF |
|------|-------|-------|
| HIGH | 5.5 W | 5.0 W |
| LOW | 1.0 W | 1.0 W |

- Modulation system

• Variable reactance frequency modulation

- Max. frequency deviation

• ±5 kHz

- Spurious emissions

• Less than -60 dB

- Microphone impedance

• 2 kΩ

■ RECEIVER

- Receive system

• Double-conversion superheterodyne

- Intermediate frequencies

• 1st 30.875 MHz 2nd 455 kHz

- Sensitivity

• Less than 0.25 μV for 12 dB SINAD

- Squelch sensitivity (threshold)

• Less than 0.158 μV

- Selectivity

• Less than ±7.5 kHz/-6 dB

• More than ±15 kHz/-60 dB

- Spurious response rejection

• Less than -60 dB

- Intermodulation rejection

• Less than -50 dB

- Audio output power

• More than 400 mW at 10 % distortion with an 8 Ω load

- Audio output impedance

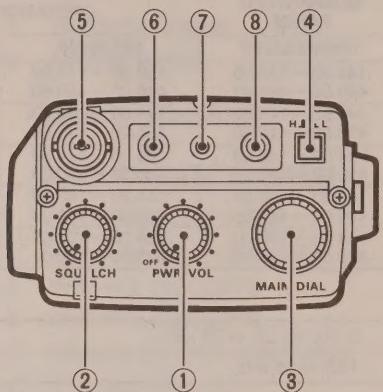
• 8 Ω

All stated specifications are subject to change without notice or obligation.

SECTION 2 OUTSIDE AND INSIDE VIEWS

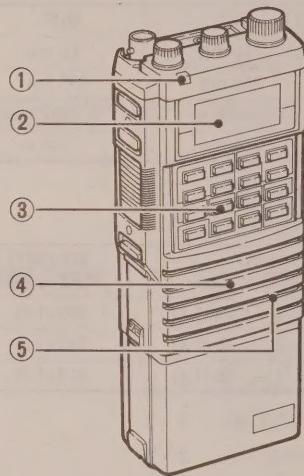
2-1 OUTSIDE VIEWS

- TOP PANEL

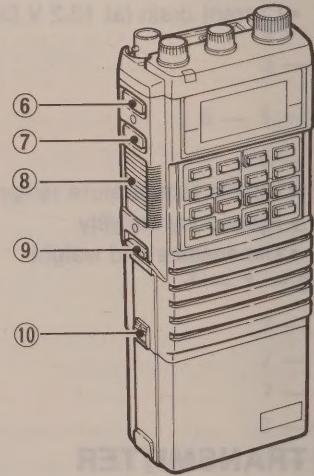


- ① POWER/VOLUME CONTROL [PWR/VOL]
- ② SQUELCH CONTROL [SQUELCH]
- ③ MAIN DIAL [MAIN DIAL]
- ④ RF OUTPUT POWER SWITCH [H/L]
- ⑤ ANTENNA CONNECTOR
- ⑥ EXTERNAL SPEAKER JACK [EXT SP]
- ⑦ EXTERNAL MICROPHONE JACK [MIC]
- ⑧ EXTERNAL DC POWER JACK [DC IN 13.8 V]

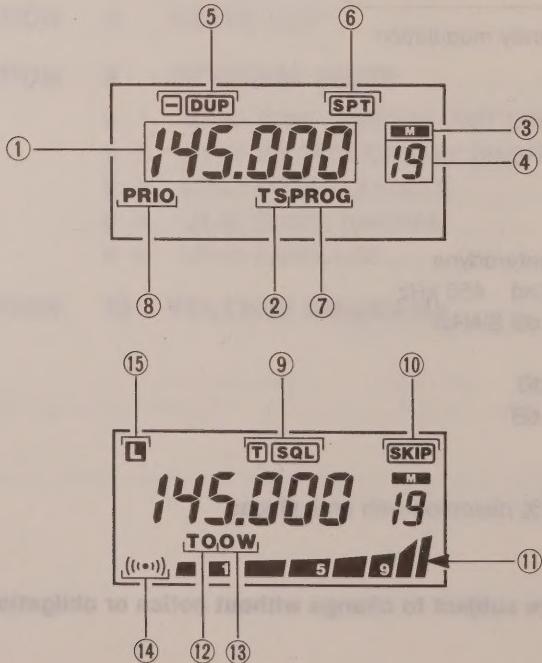
- FRONT AND SIDE PANELS



- ① TRANSMIT INDICATOR [TX]
- ② FUNCTION DISPLAY
- ③ KEYBOARD
- ④ SPEAKER
- ⑤ MICROPHONE
- ⑥ MONITOR SWITCH [MONITOR]
- ⑦ FUNCTION SWITCH [FUNCTION]
- ⑧ PTT SWITCH
- ⑨ LIGHT SWITCH [LIGHT]
- ⑩ BATTERY PACK RELEASE BUTTON [RELEASE]



- FUNCTION DISPLAY

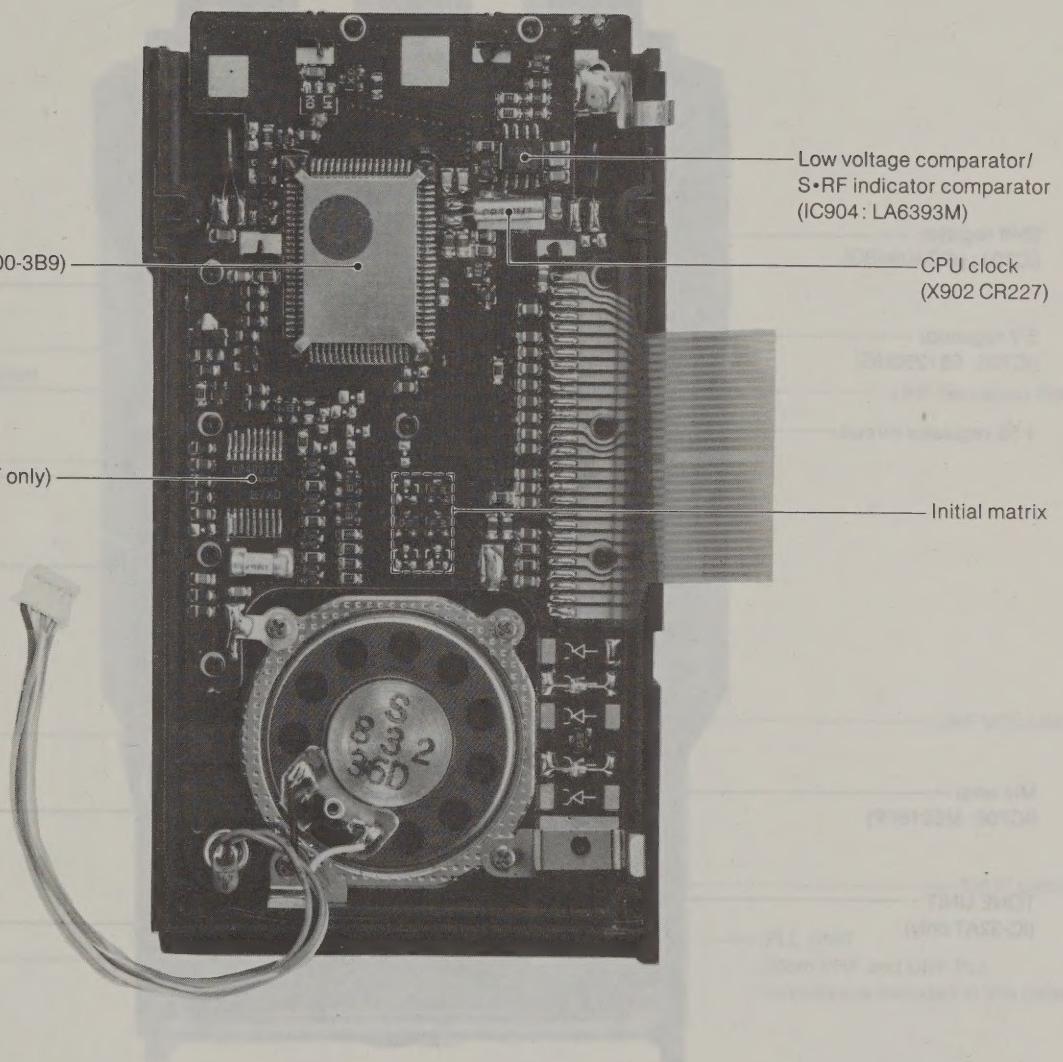


- ① FREQUENCY DISPLAY
- ② TS INDICATOR "TS"
- ③ MEMORY MODE INDICATOR "M"
- ④ MEMORY CHANNEL INDICATOR
- ⑤ DUPLEX INDICATORS “-” “DUP”
- ⑥ FULL DUPLEX INDICATOR “SPT”
- ⑦ PROGRAMMED SCAN INDICATOR “PROG”
- ⑧ PRIORITY WATCH INDICATOR “PRIO”
- ⑨ TONE AND SQUELCH INDICATORS “T” “SQL”
- ⑩ MEMORY SKIP INDICATOR “SKIP”
- ⑪ S/RF INDICATOR
- ⑫ TONE SETTING INDICATOR “TO”
- ⑬ OFFSET FREQUENCY WRITE INDICATOR “OW”
- ⑭ POCKET BEEP INDICATOR “((•))”
- ⑮ LOCK INDICATOR “L”

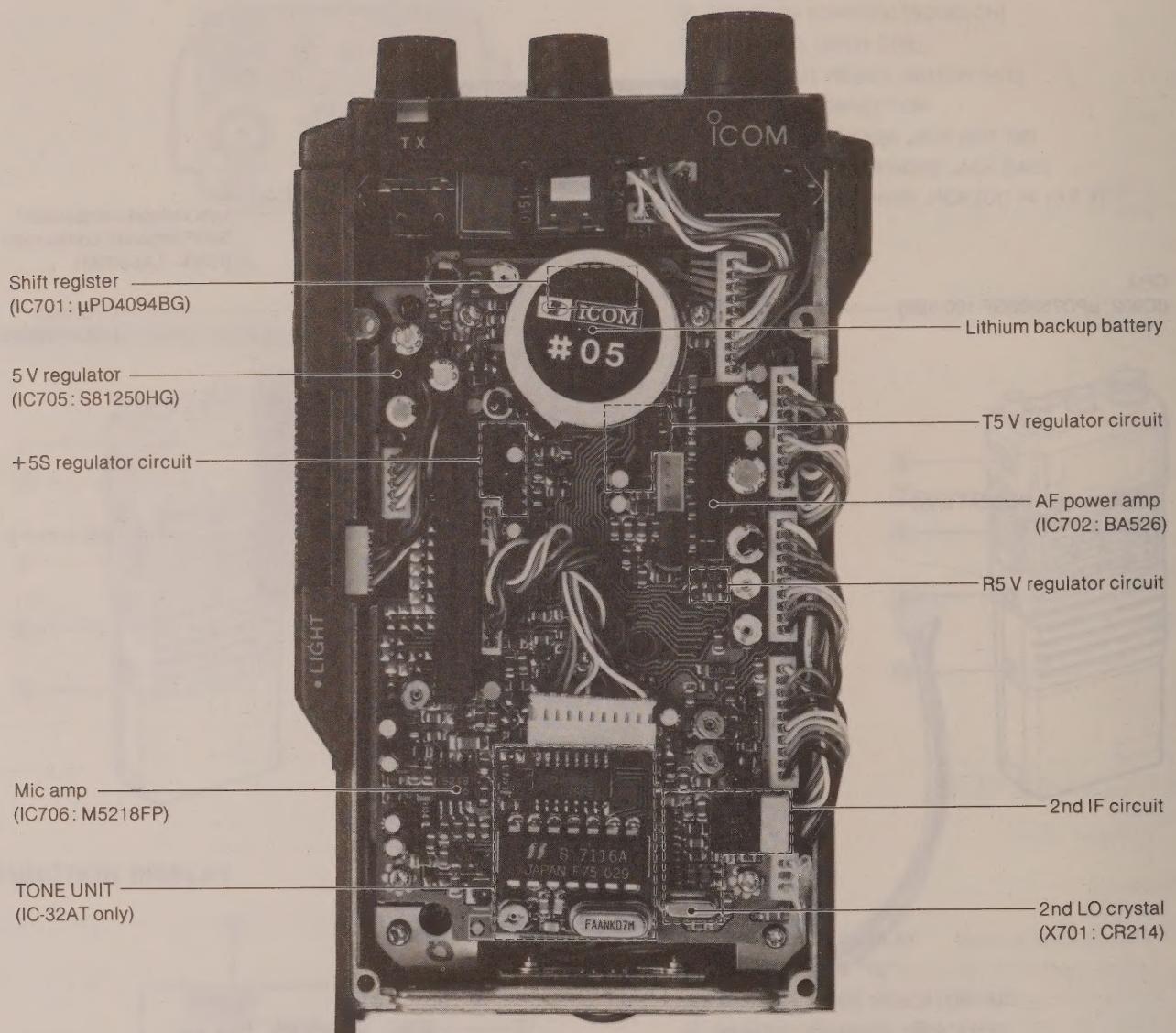
2-2 INSIDE VIEWS

TINU MAAR

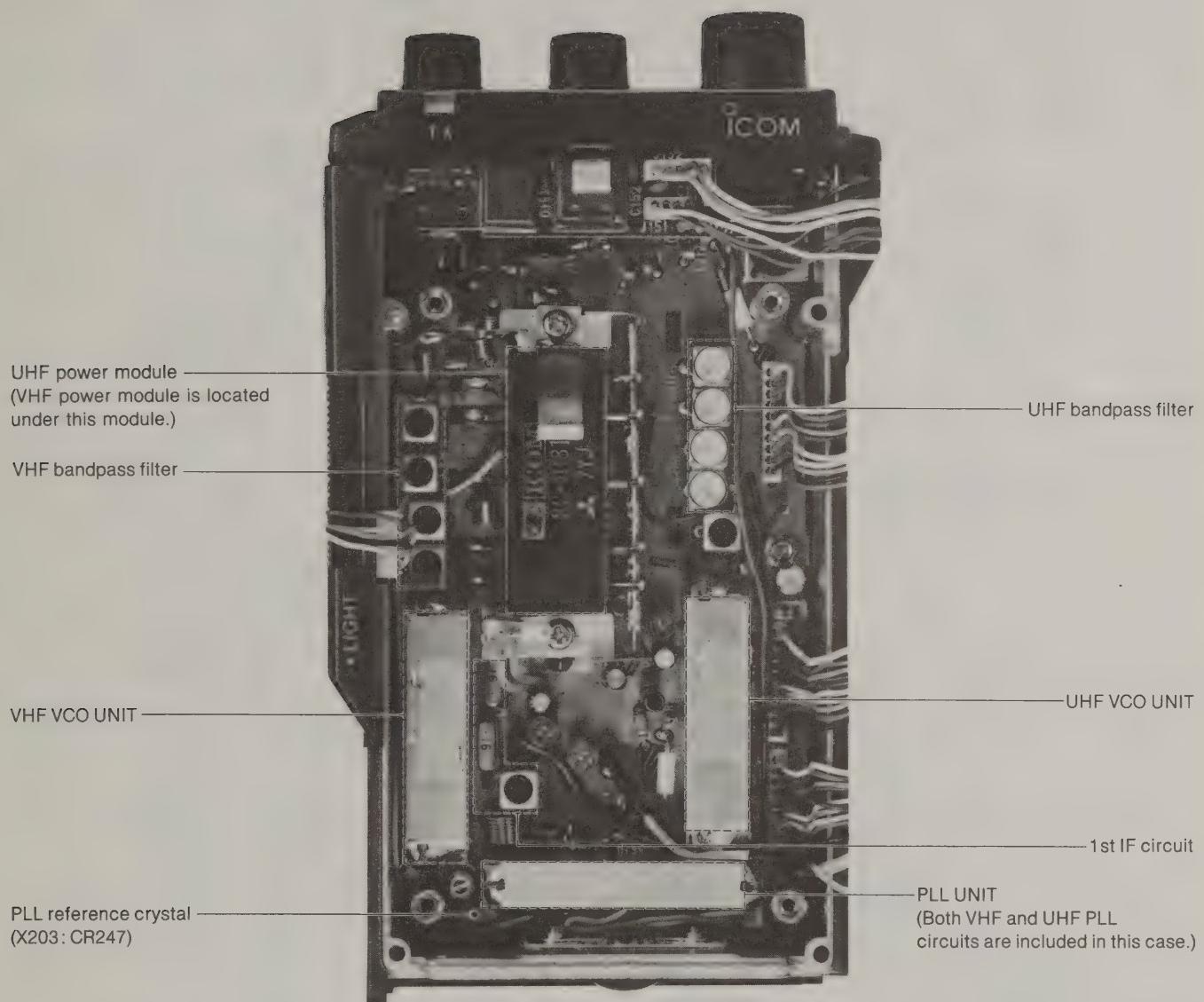
• LOGIC UNIT



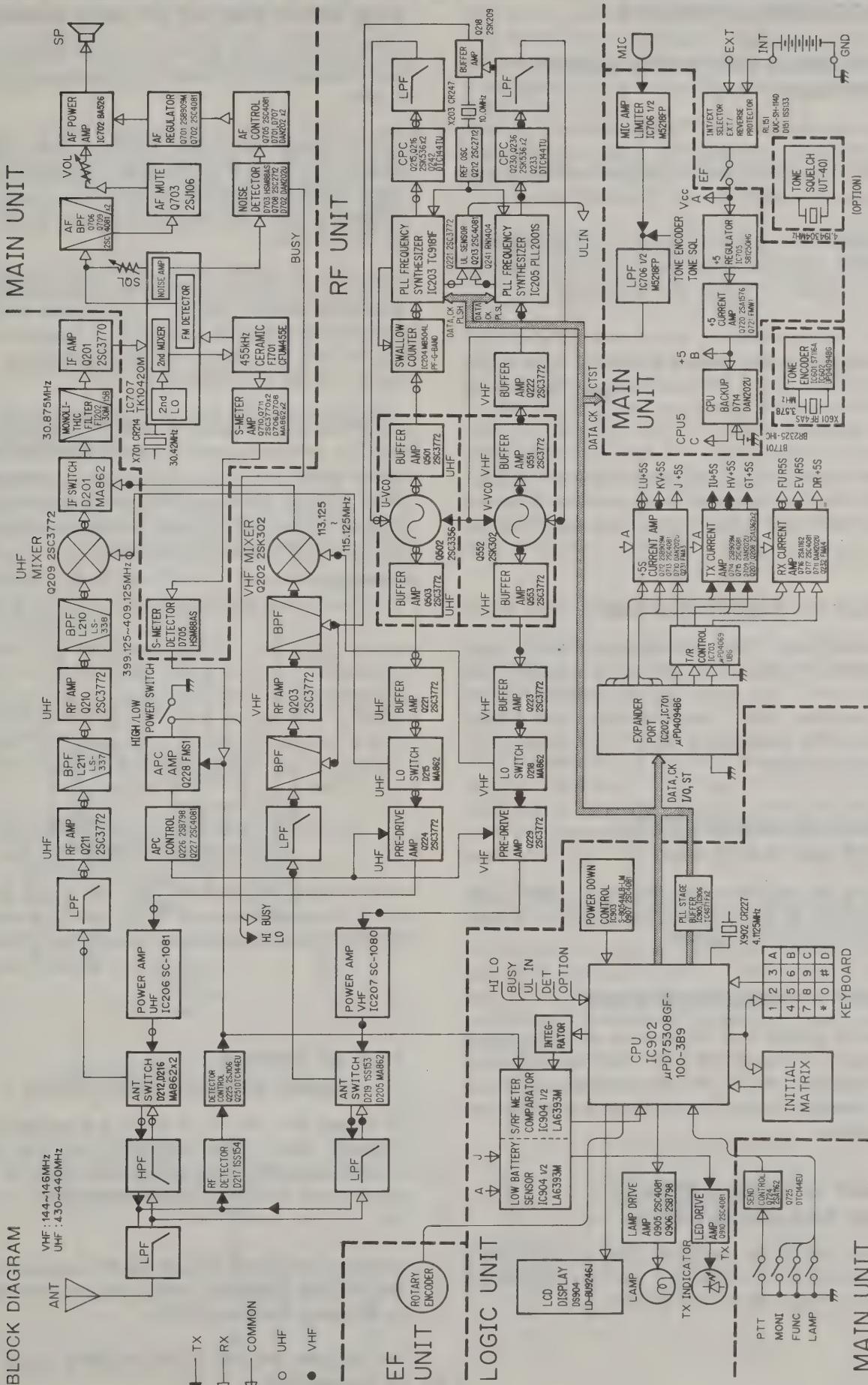
• MAIN UNIT



• RF UNIT



SECTION 3 BLOCK DIAGRAM



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (RF UNIT)

Received signals enter the ANTENNA CONNECTOR (J210) and pass through a low-pass filter (L222, L223 and C354~C358). The low-pass filter is designed to filter signals higher than 450 MHz.

To separate VHF and UHF signals, a low-pass filter (L226~L228, C376~C240) for VHF and a high-pass filter (L220, L221, C346~C350) for UHF are included.

The VHF antenna switching circuit employs a $\lambda/4$ -type diode switching system consisting of D205, D219, L206, L207 and C244~C246. While receiving, D205 and D219 turn OFF and receive signals are applied to the VHF RF amplifier circuit.

The UHF antenna switching circuit consists of D201, D216, L214 and C283~C285. While receiving, D212 and D216 turn OFF and receive signals are applied to the UHF RF amplifier circuit.

4-1-2 VHF RF CIRCUIT (RF UNIT)

VHF receive signals from the antenna switching circuit pass through a bandpass filter consisting of D204, L205, C241 and C242. The signals are then amplified at the VHF RF amplifier (Q203). Amplified signals pass through a bandpass filter consisting of D202, D203, C231, C233, C236, L203 and L204.

4-1-3 VHF 1ST MIXER CIRCUIT (RF AND V-VCO UNITS)

Filtered signals are mixed with the 1st LO signal from the V-VCO UNIT at the VHF 1st mixer (Q202) for conversion to 30.875 MHz 1st IF signals.

4-1-4 UHF RF CIRCUIT (RF UNIT)

UHF receive signals from the antenna switching circuit pass through a high-pass filter (C281, C282 and L212) and are then amplified at the UHF RF amplifiers (Q210 and Q211). Bandpass filters (L210 and L211) suppress out-of-band signals.

4-1-5 UHF 1ST MIXER CIRCUIT (RF AND U-VCO UNITS)

The filtered signals are mixed with UHF 1st LO signals from the U-VCO UNIT at the UHF 1st mixer (Q209) for conversion to 30.875 MHz 1st IF signals.

4-1-6 1ST IF CIRCUIT (RF AND MAIN UNITS)

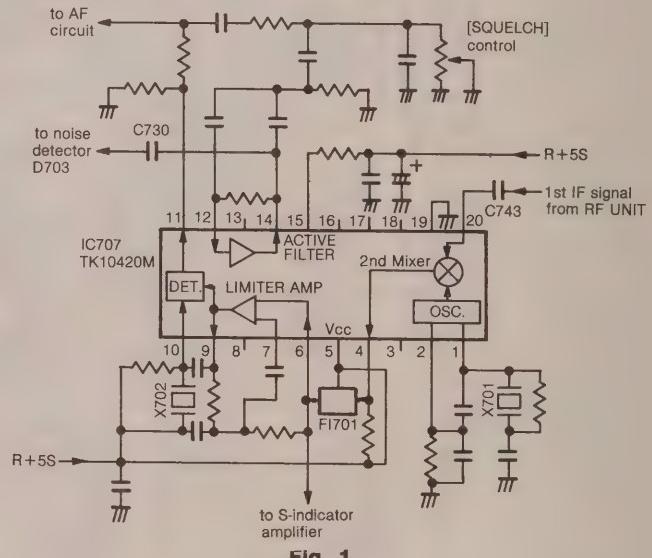
1st IF signals in both the VHF and UHF bands utilize the same frequency (30.875 MHz), and the same 1st IF circuit is used.

1st IF signals from Q209 (UHF) or Q202 (VHF) are applied to a pair of mechanical crystal filters (FI202) which determine receiver selectivity. 1st IF signals amplified at Q201 are applied to an FM IC chip (IC707) on the MAIN UNIT.

IC707 contains the oscillator, mixer, limiter amplifier, and quadrature detector circuits. 1st IF signals from the RF UNIT are applied to pin 20 of IC707. Signals are mixed with the 2nd LO signal at the mixer section for conversion to 455 kHz 2nd IF signals.

2nd IF signals are output from pin 4 and pass through FI701 for removal of unwanted heterodyned signals. The filtered signals re-enter at pin 6 and are amplified in the limiter amplifier section. Amplified signals are detected at the quadrature detector section using ceramic resonator X702 for conversion to audio signals.

IF CIRCUIT



4-1-7 AF CIRCUIT (MAIN, EF AND LOGIC UNITS)

AF signals from pin 11 of IC707 are applied to a de-emphasis circuit (R724 and C732) and are amplified at Q706 and Q709. The de-emphasis circuit is an integrator circuit with frequency characteristics of -6 dB/oct .

Amplified signals pass through the AF mute switch (Q703) and VOLUME CONTROL (R151), and are then applied to the AF power amplifier (IC702).

The AF power amplifier (IC702) amplifies signals to drive the speaker (SP901).

4-1-8 SQUELCH CIRCUIT (MAIN AND EF UNITS)

A portion of signals from pin 11 of IC707 is applied to active filter pin 12 of IC707. The SQUELCH CONTROL (R152) is connected to the active filter input to control the input level. The active filter amplifies noise components of 20 kHz or more.

The noise components output from pin 14 are then rectified by D703 for conversion to DC voltage. When this voltage is at a "HIGH" level, Q708 turns ON, and Q705 turns OFF. Thus Q701 and Q702, the power source circuit of AF power amplifier IC702, is deactivated.

While transmitting, R+5S is not applied to Q705, thus the power source circuit (Q701 and Q702) is deactivated.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN UNIT)

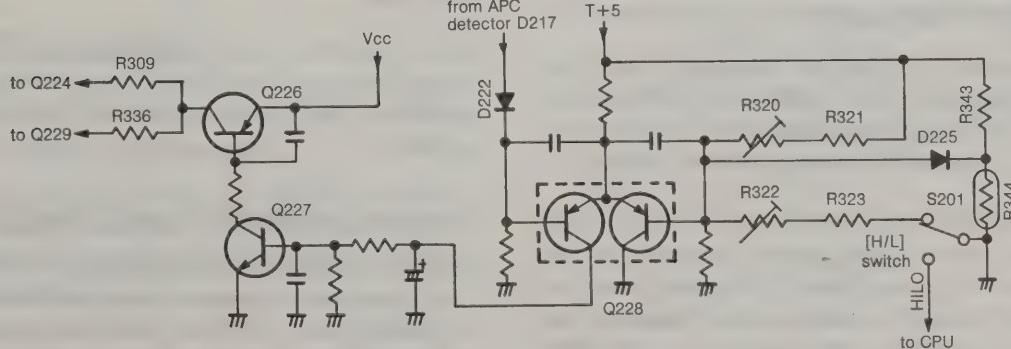
AF signals from microphone MC901 or from the EXTERNAL MICROPHONE JACK (J203) are amplified at a limiter amplifier (pin 3 of IC706). This limiter amplifier is formed by a negative feedback circuit with frequency characteristics set at +6 dB/oct. This causes the limiter amplifier to function as a pre-emphasis circuit.

AF signals from the limiter amplifier (pin 1 of IC706) are applied to a splatter filter (pin 6 of IC706) for removing harmonic distortion components higher than 3 kHz. The output signal from the splatter filter (pin 7 of IC706) is applied to D552 through R781 (VHF) or applied to D501 through R779 (UHF) for performing frequency modulation.

4-2-2 VHF BUFFER AMPLIFIER CIRCUIT (V-VCO AND RF UNITS)

VHF signals from the V-VCO UNIT are amplified at buffer amplifiers Q553 and Q223, pass through transmit and receive switching diode D218, and are amplified at driver Q229, thus obtaining drive power.

APC CIRCUIT



4-2-3 VHF POWER AMPLIFIER CIRCUIT (RF UNIT)

Amplified signals at Q229 are power amplified at IC207 and obtain more than 5.5 W (when HIGH is selected) or 1 W (when LOW is selected). Output power from IC207 passes through an antenna switching circuit (D219) and a low-pass filter, and then is applied to the ANTENNA CONNECTOR (J210).

4-2-4 UHF BUFFER AMPLIFIER CIRCUIT (U-VCO AND RF UNITS)

UHF signals from the U-VCO UNIT are amplified at buffer amplifiers Q501 and Q221, pass through transmit and receive switching diode D215 and are amplified at driver amp Q224, thus obtaining drive power.

4-2-5 UHF POWER AMPLIFIER CIRCUIT (RF UNIT)

Amplified signals at Q224 are power amplified at IC206 and obtain more than 5 W (when HIGH is selected) or 1 W (when LOW is selected). Output power from IC206 passes through an antenna switching circuit (D216), a high-pass filter and a low-pass filter, and then is applied to the ANTENNA CONNECTOR (J210).

4-2-6 APC CIRCUIT (RF UNIT)

The APC circuit protects the power modules (IC206 and IC207) from a mismatched output load and selects HIGH and LOW output power.

The output power level from the power module (IC206 or IC207) is detected at the APC detector (D217). When antenna impedance is matched at $50\ \Omega$, the detected level is at a minimum. However, when antenna impedance is mismatched, the detected voltage is higher than when matched.

When the antenna impedance is mismatched, the base voltage of Q228 is higher than the other base voltage of Q228 (reference voltage). Q228 decreases the collector current of Q226 using Q227. Q226 collector current is used at the driver amplifier (Q224 or Q229). Hence, when the antenna impedance is mismatched, output power is decreased.

Fig. 2

The output power selecting circuit uses the APC circuit. The [H/L] switch on the top panel selects the reference voltage, changing output power to HIGH or LOW.

4-3 VHF PLL CIRCUITS

4-3-1 GENERAL (RF AND V-VCO UNITS)

The VHF PLL circuit uses a one chip PLL IC (IC205) which contains a programmable divider, phase detector, data shift register and data latch circuits. IC205 controls the VHF VCO oscillating frequency using varicap diodes D553 and D554. The VHF VCO oscillating frequency is used as a VHF transmitting frequency while transmitting or as a VHF 1st LO signal while receiving.

The oscillated signal at the VHF VCO circuit is buffer amplified at Q551 and Q222, and is applied to pin 8 of IC205. IC205 divides the signal using N-data from the CPU (IC902) and phase detects the divided signal using the reference oscillator signal. The phase detected signal is converted to a DC voltage (lock voltage) by the charge pump and loop filter. The lock voltage is applied to varicap diodes D553 and D554 in the VHF VCO circuit to control the VCO oscillating frequency. A stable, desired frequency is thus obtained by this loop.

VHF PLL CIRCUIT BLOCK DIAGRAM

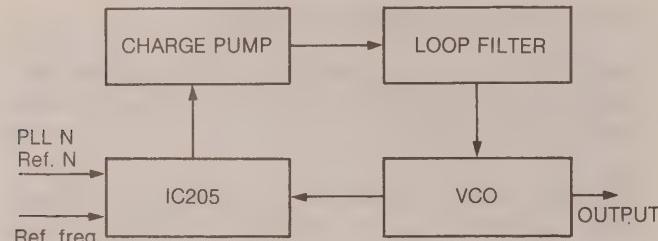


Fig. 3

4-3-2 REFERENCE OSCILLATOR CIRCUIT (RF UNIT)

Q212 and X203 oscillate a 10.0 MHz signal. The signal is divided in the divider inside IC203 to obtain the reference frequency. The reference frequency, 6.25 kHz or 5 kHz, is determined by the IC203 dividing ratio using N-data from the CPU (IC902) to obtain selectable tuning steps of 5, 10, 12.5, 15, 20 or 25 kHz.

4-3-3 CHARGE PUMP AND LOOP FILTER CIRCUITS (RF UNIT)

The phase detected signals output from pins 5 and 12 of IC205 are pulse signals. These signals are converted to DC voltage by the charge pump (Q217 and Q219) and the loop filter (R283, R284, R303, C314, C331 and C333).

Q230 and Q236 form the charge pump control circuit which cuts off charge pump output. Signals are not applied to the VCO circuit while the power saver is activated. Q218 is a DC amplifier which amplifies the lock voltage to tune the center frequency of the VHF bandpass filter.

4-3-4 VCO CIRCUIT (V-VCO UNIT)

The VCO (Variable Control Oscillator) circuit oscillates the 1st LO frequency in receive mode and transmit frequency in transmit mode. The VCO free-run frequency is shifted by D551 using C556. The generated frequency is controlled by D553 and D554 using the lock voltage output from the loop filter.

4-4 UHF PLL CIRCUITS

4-4-1 GENERAL (RF AND U-VCO UNITS)

The UHF VCO circuits use a PLL IC (IC203) and a swallow counter (IC204).

IC203 controls the UHF VCO oscillating frequency using varicap diode D501. The UHF VCO oscillating frequency is used as a UHF transmitting frequency while transmitting or as a UHF 1st LO signal while receiving.

The oscillated signal at the UHF VCO circuit is buffer amplified at Q503, and is applied to pin 1 of IC204. IC204 divides the signal either 1/64 or 1/65. The divided signal is then applied to pin 9 of IC203. IC204 divides the signal using the N-data from the CPU (IC902) and phase detects the divided signal using the reference oscillator signal. The phase detected signal is converted to a DC voltage (lock voltage) by the charge pump and loop filter. The lock voltage is applied to varicap diode D501 in the UHF VCO circuit to control the VCO oscillating frequency. A stable desired frequency is thus obtained by this loop.

4-4-2 REFERENCE OSCILLATOR CIRCUIT (RF UNIT)

Q212 and X203 oscillate a 10.0 MHz signal. The signal is divided in the divider inside IC203 to obtain the reference frequency. The reference frequency, 6.25 kHz or 5 kHz, is determined by the IC203 dividing ratio using N-data from the CPU (IC902) to obtain selectable tuning steps of 5, 10, 12.5, 15, 20 or 25 kHz.

4-4-3 CHARGE PUMP AND LOOP FILTER CIRCUITS (RF UNIT)

The phase detected signals output from pins 19 and 21 of IC203 are pulse signals. These signals are converted to a DC voltage by the charge pump (Q237, Q238 and Q239) and the loop filter (C309, C310, R276, R277, R292 and C508).

Q215 and Q216 form the charge pump control circuit which cuts off charge pump output. Signals are not applied to the VCO circuit while the power saver is activated.

4-4-4 VCO CIRCUIT (U-VCO UNIT)

The VCO (Variable Control Oscillator) circuit oscillates the 1st LO frequency in receive mode and transmit frequency in transmit mode. The VCO free run frequency is shifted by D502. The generated frequency is controlled by D501 using the lock voltage output from the loop filter.

4-5 POWER SUPPLY CIRCUITS

4-5-1 VOLTAGE LINES (MAIN UNIT)

| LINE | DESCRIPTION |
|------|---|
| Vcc | Battery pack voltage or external DC power that passes through the POWER CONTROL (R151). Vcc is applied to the power modules (IC206 or IC207), the AF power amp. regulator, and the following 5 V lines. |
| +5 | Common 5 V current amplified at Q720 and Q721 using IC705 output as a reference voltage. |
| +5S | 5 V controlled by the power saver function. Current amplified at Q712 and Q713. |
| R+5S | 5 V controlled by the power saver function. Current amplified at Q716 and Q717. Used by the receive circuits. |
| T+5 | 5 V current amplified at Q714 and Q715. Used by the transmitter circuits. |

4-5-2 VOLTAGE REGULATOR CIRCUIT (MAIN UNIT)

When the battery voltage is 5.5~16 V, the regulator (IC705) outputs a reference voltage of 5 V. The noise components are removed by the noise filter (C785, R756). This output is applied to the current amplifier (Q720, Q721).

4-5-3 CPU POWER SOURCE CIRCUIT (MAIN UNIT)

When the transceiver is turned OFF, a voltage is applied to IC902 (CPU) from lithium backup battery BT701.

4-5-4 T+5/R+5S SWITCHING CIRCUIT (MAIN AND LOGIC UNITS)

When the PTT switch (S703) is pushed, Q724 is turned ON. The collector of Q725 outputs a "LOW" signal to pin 64 of IC902 (CPU).

Pin 40 of IC902 sends transmit data to IC701. Pin 12 of IC701 outputs a "HIGH" signal. Pin 11 of IC701 outputs a "LOW" signal to pin 13 of IC703c, controlling the base of Q717. Thus, R5+S is turned OFF. Pin 12 of IC701 outputs a "HIGH" signal to pin 1 of IC703e, controlling the base of Q715. Thus T+5 is turned ON.

4-6 OTHER CIRCUITS

4-6-1 SUBAUDIBLE TONE ENCODER UNIT (TONE UNIT) (IC-32AT only)

IC601 generates subaudible tones. A generated tone is made via the dividing oscillator, and a dividing ratio is controlled by 6-bit data from a shift resistor (IC602). R601 adjusts deviation.

4-6-2 DTMF ENCODER CIRCUIT (MAIN AND LOGIC UNITS) (IC-32AT only)

The DTMF encoder (IC901), generates Dual Tone Multi Frequencies. If any key on the KEYBOARD is pushed while transmitting, the proper frequency dividing ratio for the frequency of X901 (3.58 MHz) is selected. One set of audio frequencies corresponding to row input and column input is then output from pin 17.

Also, a "HIGH" level signal is output from pin 11 of IC901 when the KEYBOARD is activated. This level is applied to an integrator circuit (R750, R754 and C773) in the MAIN UNIT to obtain a time constant of approx. 1 sec. for turning Q719 ON. Thus transmission continues during keying.

4-6-3 TONE CALL CIRCUIT (MAIN UNIT) (IC-32E only)

This circuit generates a 1750 Hz tone to open a repeater. When the TONE CALL switch (R152) is pushed, Q718 is turned ON and T+5 voltage is applied to IC704. IC704 divides 7.1680 MHz by 4096 and outputs 1750 Hz tones from pin 4. R748 adjusts deviation.

4-6-4 S/RF-INDICATOR CIRCUIT (MAIN AND LOGIC UNITS)

A portion of signals passed from FI701 is amplified at the S-indicator amplifier (Q711, Q710), and is detected at voltage doubler (D705). The voltage from D705 or APC detector voltage from D222 is applied to indicator comparator pin 2 of IC904b.

The signal passes through an integrator circuit (R933 and C908); the voltage at pin 3 of IC904 increases with time. When the voltage at pin 3 is greater than pin 2, pin 1 outputs "HIGH." The voltage of pin 3 of IC904 depends on time. IC902 measures the time during which pin 49 outputs "HIGH" and pin 50 receives "HIGH." The S/RF-INDICATOR, DS904, is for indicating the relative signal strength or output power.

S/RF INDICATOR CIRCUIT

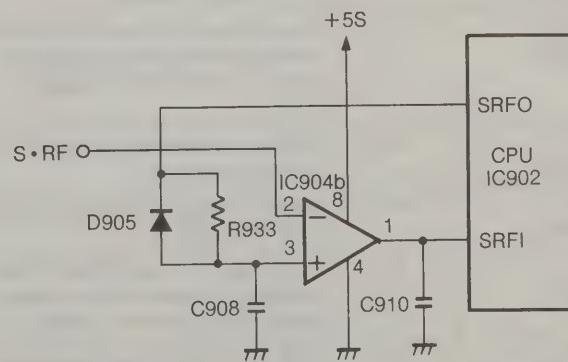


Fig. 4

4-6-5 LAMP CIRCUIT (LOGIC UNIT)

When the LIGHT SWITCH (S701) is pushed, pin 46 of IC902 (CPU) remains "HIGH" for 5 sec. The current of this signal is amplified at Q905 and Q906 to illuminate backlights DS902 and DS903.

If the LIGHT switch is pushed again when pin 46 is in a "HIGH" condition, pin 46 returns to "LOW" when switches are not being used.

4-6-6 POWER SAVER CIRCUIT (MAIN UNIT)

The power saver function starts after approx. 30 sec. when no switch is pushed and the squelch is closed, or when the transceiver is in receive mode.

When the power saver function starts, pin 47 of IC902 (CPU) outputs a power saver signal (IOST) as in the following timing diagram. A +5M signal from pin 13 of IC701 controls +5S signals; RX5 signals from pin 11 control R+5S signals.

4-6-7 LOW VOLTAGE DETECTED CIRCUIT (LOGIC UNIT)

This circuit consists of IC904a, R928 and R926. 1.16 V is applied to pin 5 of IC904a. The Vcc voltage is divided by R926 and R928, and the divided voltage is applied to pin 6 of IC904a. When the Vcc voltage exceeds 5.7 V, the voltage at pin 6 becomes greater than that at pin 5 and pin 7 becomes "LOW." When the Vcc voltage is less than 5.7 V, the voltage at pin 5 exceeds that at pin 6 and pin 7 outputs in a "HIGH" condition. TRANSMIT INDICATOR DS901 does not light even when transmitting.

4-7 CPU PORT ALLOCATIONS (LOGIC UNIT)

| PORT NO. | PIN NO. | DESCRIPTION | PORT NO. | PIN NO. | DESCRIPTION |
|--------------------------|---------|--|----------------------|---------|--|
| RESET | 68 | When a "LOW" signal is applied, CPU IC902 is initialized. | P33 [ENC] | 53 | Input port for acknowledge signal whether the tone encoder IC601 is connected or not. |
| PO0 [INT4] | 38 | Detects a signal for the standby mode of the CPU. The CPU enters the standby mode when the port reads the trailing edge of a signal. | P40~P43 [KR0~KR3] | 29~32 | These are input ports for the keyboard matrices. |
| PO1 [CK] | 39 | Outputs a serial data output clock for PLL N-data, subaudible tones, and I/O expander data. | P50~P53 [KS0~KS3] | 34~37 | These are output ports for strobe signals for the initial and keyboard matrices. |
| PO2 [DATA] | 40 | Outputs serial data synchronized with CK signals. | P60 [UNLKLV] | 60 | Input port for a PLL unlock signal. Normally this port is "LOW." When the PLL is unlocked the port receives "HIGH" signals. |
| PO3 [BUSY] | 41 | Inputs a squelch signal. When the squelch opens, a "HIGH" signal is applied. | P61 [DET] | 61 | Input port for an acknowledge signal in the optional UT-40 TONE SQUELCH UNIT. The port becomes "HIGH" when the tone squelch opens. |
| PO10~PO13 [KIR0~KIR3] | 42~45 | Input ports for the initial matrix. | P62 [DIAL DN] | 62 | Input port for the down signal of the MAIN DIAL (S151). |
| P2 [LAMPO] | 46 | Outputs control signals for the FUNCTION DISPLAY intensity. | P63 [DIAL UP] | 63 | Input port for the up signal of the MAIN DIAL (S151). |
| P21 [IOTSB] | 47 | Outputs a strobe signal for serial data to the output expander. | P70 [PTT] | 64 | Input signal on the PTT line. This port receives "HIGH" signals when the PTT switch is pushed. |
| P22 [CTSTB] | 48 | Outputs a strobe signal for serial data to the subaudible tone encoder or optional UT-40 TONE SQUELCH UNIT. | P71 [FUNC] | 65 | Input port for the FUNCTION switch (S702). |
| P23 [SRFO] | 49 | Outputs a reference voltage for the S/RF INDICATOR. | P72 [MONI] | 66 | Input port for the MONITOR switch (S151). |
| P30 [SRFI] | 50 | Inputs a comparated signal for the S/RF INDICATOR. | P73 [LAMP] | 67 | Input port for the LIGHT switch (S701). |
| P31 [HI/LO] | 51 | Output port for the RF INDICATOR. This port becomes "HIGH" when HIGH output power is selected. | BP6 [PLSL] | 19 | Outputs a strobe signal for the VHF PLL IC (IC205). |
| P32 [ENC/DEC] | 52 | Input port for acknowledge signal which acknowledges whether the optional UT-40 TONE SQUELCH UNIT is connected or not. | BP7 [PLSH] | 20 | Outputs a strobe signal for the UHF PLL IC (IC203). |

I/O EXPANDER IC701 (MAIN UNIT)

| PORT NO. | PIN NO. | DESCRIPTION |
|-----------------|---------|--|
| Q1 [SQL OFF] | 4 | Outputs a "HIGH" signal when the MONITOR switch (S701) is pushed. |
| Q2 [RMUTE] | 5 | Outputs an AF mute signal when the optional UT-40's pocket beep function is activated. |
| Q4 [BEEPO] | 7 | Outputs 500 Hz or 1 kHz beep tones. |
| Qs [+5M] | 9 | Outputs a square wave during the power saver condition. When this port is "HIGH," a +5S signal is cut OFF. |
| Q7 [TX5] | 12 | Outputs "HIGH" signals during transmissions. Controls the T+5 line. |
| Q8 [RX5] | 11 | Outputs square waves during the power saver condition. When this port is "HIGH," the R+5S line is cut OFF. |

I/O EXPANDER IC202 (RF UNIT)

| PORT NO. | PIN NO. | DESCRIPTION |
|---------------|---------|--|
| Q1 [BANDL] | 4 | Outputs "LOW" signals when the VHF band is selected. |
| Q2 [TXL] | 5 | Outputs "LOW" signals during VHF band transmission. |
| Q3 [RXL] | 6 | Outputs "LOW" signals during VHF band reception. |
| Q4 [CPCL] | 7 | Outputs square waves during the power saver condition. Outputs "LOW" signals when the VHF band is selected and during the power saver condition. |
| Q5 [BANDH] | 14 | Outputs "LOW" signals when the VHF band is selected. |
| Qs [TXH] | 9 | Outputs "HIGH" signals during UHF band transmission. |
| Q7 [RXH] | 12 | Outputs "HIGH" signals during UHF band reception. |
| Q8 [CPCH] | 11 | Outputs square waves during the power saver condition. When this port is "HIGH," the VLV line is cut OFF. |

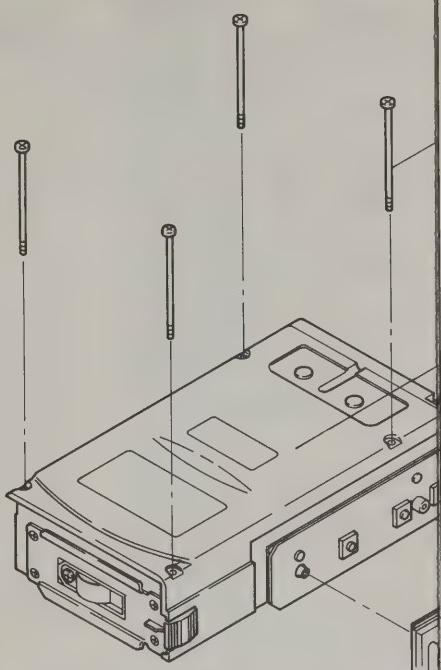
SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

5-1 MECHANICAL PARTS

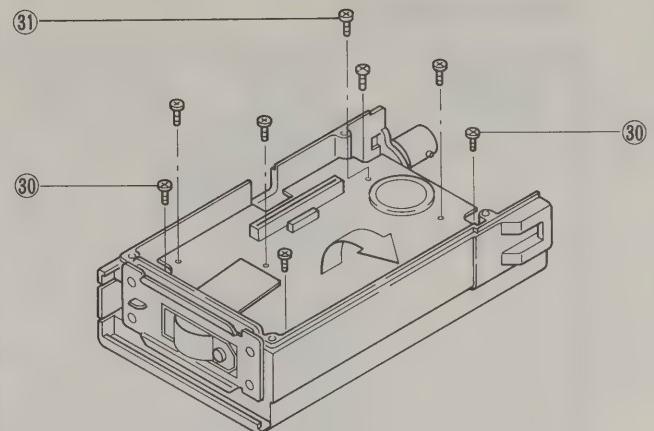
| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|-------------------------------|-----------------|------|
| ① | PH B0 2×31.5 ZK | 8810004000 | 4 |
| ② | 575 Rear panel | 8010007140 | 1 |
| ③ | 575 PTT rubber | 8930012400 | 1 |
| ④ | PTT plates | 8930011600 | 2 |
| ⑤ | PTT holder | 8930013110 | 1 |
| ⑥ | PTT button | 8930011910 | 1 |
| ⑦ | PH No. 0-3 M2×6 ZK | 8810004890 | 2 |
| ⑧ | PH B0 No. 0-3 M1.4×3.5 ZK | 8810001710 | 11 |
| ⑨ | Plate (SP) | 8930012760 | 1 |
| ⑩ | PH B0 No. 0-1 M2×4 | 8810004800 | 4 |
| ⑪ | 575 Front ground plate | 8930013300 | 1 |
| ⑫ | SP plate | 8930012100 | 1 |
| ⑬ | 562 Keyboard (A) | 8010007150 | 1 |
| ⑭ | 573 MIC holder | 8930011930 | 1 |
| ⑮ | SP seal | 8930011580 | 1 |
| ⑯ | 573 Casing seal (center) | 8930012410 | 1 |
| ⑰ | 575 Front panel (A) (IC-32E) | 8210003300 | 1 |
| | 575 Front panel (B) (IC-32AT) | 8210003310 | 1 |
| | 575 Front panel (C) (IC-32A) | 8210003320 | 1 |
| ⑱ | Knob (MAIN) N128 | 8610004290 | 1 |
| ⑲ | Knobs (SQUELCH, PWR/VOL) N126 | 8610004230 | 2 |
| ⑳ | VR nuts (E) | 8830000550 | 3 |
| ㉑ | PH M2×6 ZK | 8810004860 | 2 |
| ㉒ | Connector seal | 8930012420 | 1 |
| ㉓ | 575 Top panel-1 (IC-32A/AT) | 8210003200 | 1 |
| | 575 Top panel (A)-1 (IC-32E) | 8210003210 | 1 |
| ㉔ | Top seal | 8930012390 | 1 |
| ㉕ | Seal plate | 8930012300 | 1 |
| ㉖ | PH No. 0-3 M1.4×3.5 ZK | 8810001710 | 1 |
| ㉗ | PH No. 0-1 M2×2.5 | 8810004870 | 2 |
| ㉘ | LCD holder | 8930012190 | 1 |
| ㉙ | LCD reflector | 6910002060 | 1 |
| ㉚ | PH M2×4 Ni FE | 8810005320 | 4 |
| ㉛ | PH M2×3 Ni FE | 8810004950 | 5 |
| ㉜ | 573 standoff | 8930012081 | 4 |
| ㉝ | PH M2×3 Ni FE | 8810004950 | 1 |
| ㉞ | PH M2.6×10 Ni | 8810004730 | 2 |
| ㉟ | Plate | 8930012280 | 1 |
| ㉟ | Screw lug M2 | 8860000010 | 2 |
| ㉟ | Contact holder | 8930011880 | 1 |
| ㉟ | BuH M2×6 Ni BS | 8810002580 | 1 |
| ㉟ | Latch plate (B) | 8930013430 | 1 |
| ㉟ | Sliding guide | 8010006990 | 1 |
| ㉟ | FH M2×4 Ni BS | 8810002310 | 4 |
| ㉟ | Release button (A) | 8930008610 | 1 |
| ㉟ | PH M2×5 Ni | 8810005310 | 1 |
| ㉟ | Connection spring | 8930005980 | 1 |

Screw type Screw: M2×3, etc. Self-tapping screw: B0 2×15, etc. Precision type screw: No. 0-1, etc.
Screw head style PH: Pan head FH: Flat head BuH: Button head

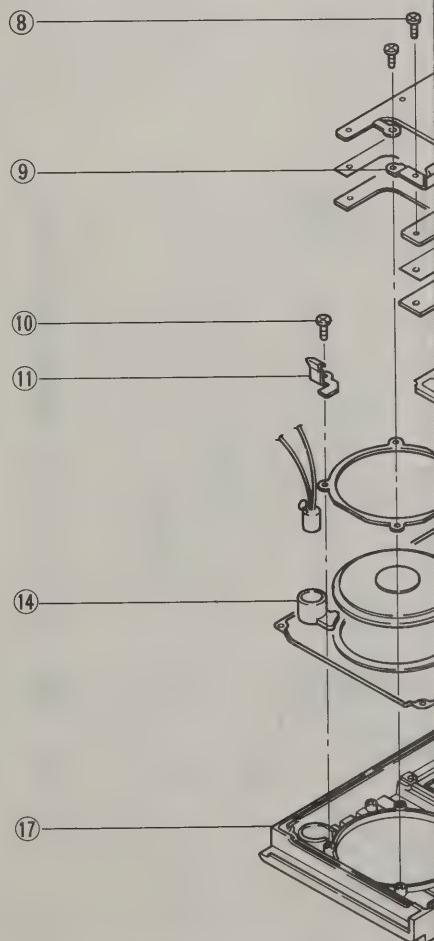
• CASE AND CHASSIS



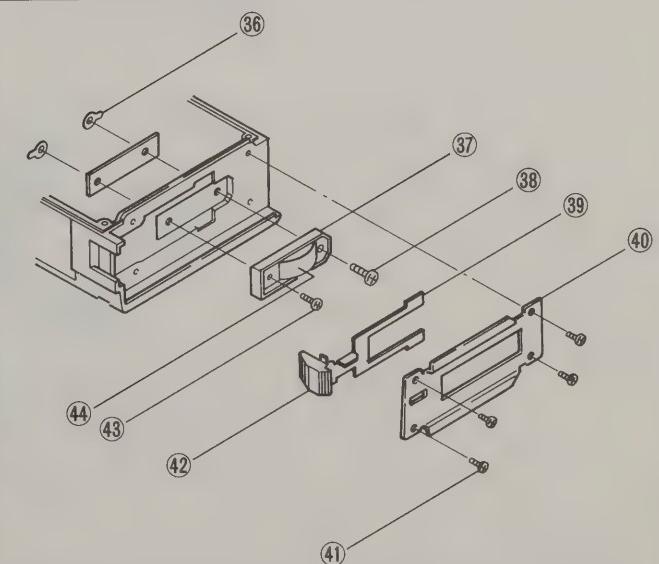
• MAIN UNIT



• LOGIC UNIT



• CONTACT HOLDER



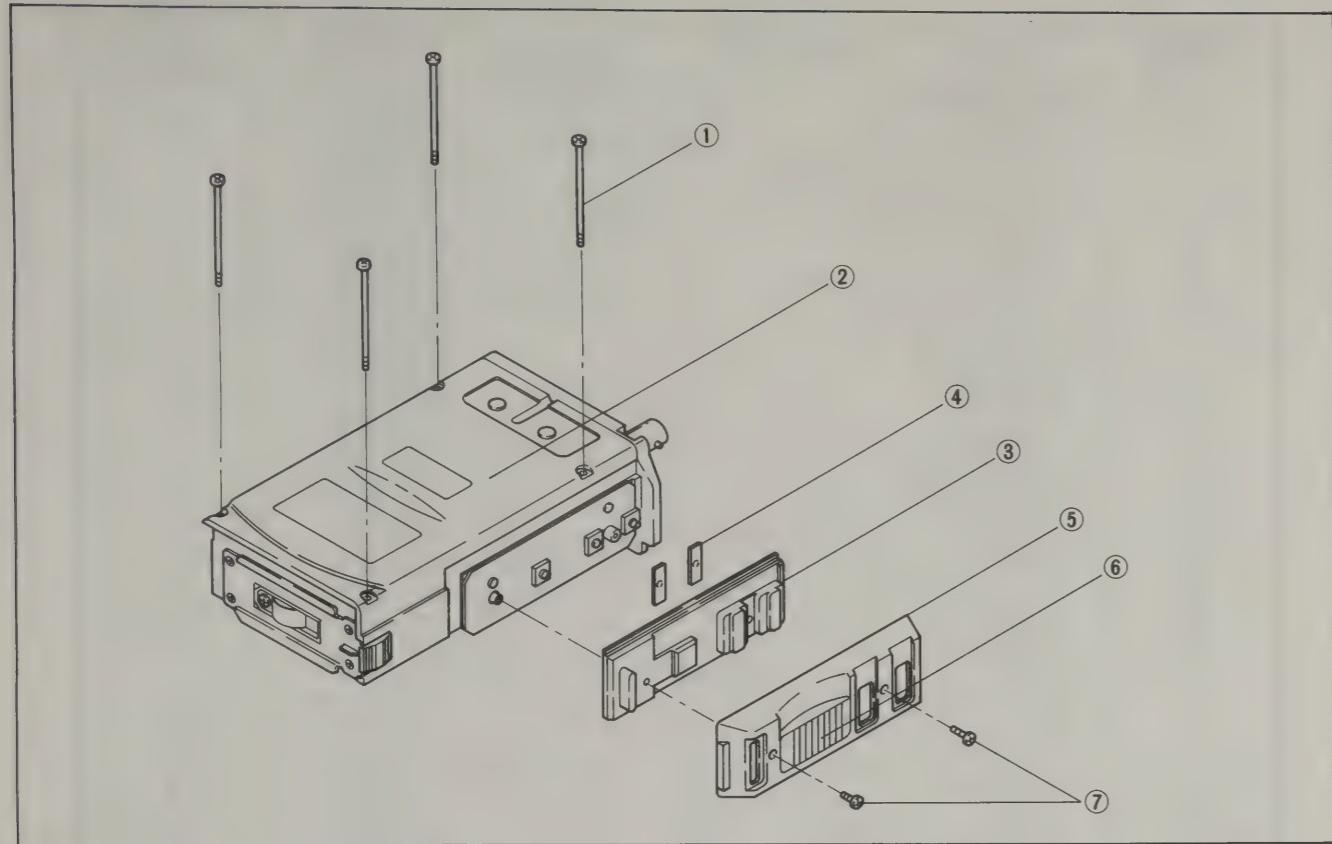
SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

5-1 MECHANICAL PARTS

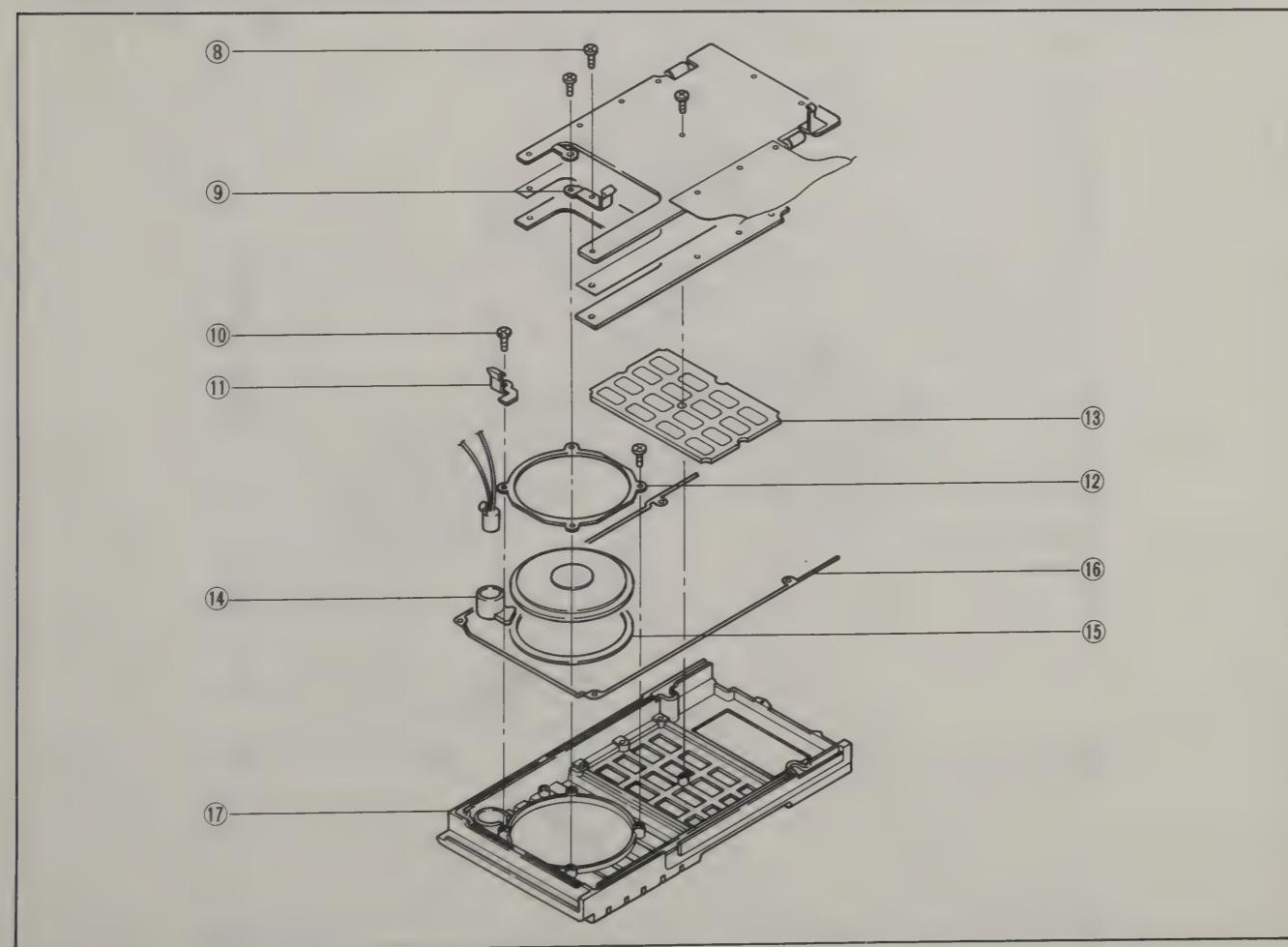
| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|-------------------------------|-----------------|------|
| ① | PH B0 2×31.5 ZK | 8810004000 | 4 |
| ② | 575 Rear panel | 8010007140 | 1 |
| ③ | 575 PTT rubber | 8930012400 | 1 |
| ④ | PTT plates | 8930011600 | 2 |
| ⑤ | PTT holder | 8930013110 | 1 |
| ⑥ | PTT button | 8930011910 | 1 |
| ⑦ | PH No. 0-3 M2×6 ZK | 8810004890 | 2 |
| ⑧ | PH B0 No. 0-3 M1.4×3.5 ZK | 8810001710 | 11 |
| ⑨ | Plate (SP) | 8930012760 | 1 |
| ⑩ | PH B0 No. 0-1 M2×4 | 8810004800 | 4 |
| ⑪ | 575 Front ground plate | 8930013300 | 1 |
| ⑫ | SP plate | 8930012100 | 1 |
| ⑬ | 562 Keyboard (A) | 8010007150 | 1 |
| ⑭ | 573 MIC holder | 8930011930 | 1 |
| ⑮ | SP seal | 8930011580 | 1 |
| ⑯ | 573 Casing seal (center) | 8930012410 | 1 |
| ⑰ | 575 Front panel (A) (IC-32E) | 8210003300 | 1 |
| | 575 Front panel (B) (IC-32AT) | 8210003310 | 1 |
| | 575 Front panel (C) (IC-32A) | 8210003320 | 1 |
| ⑱ | Knob (MAIN) N128 | 8610004290 | 1 |
| ⑲ | Knobs (SQUELCH, PWR/VOL) N126 | 8610004230 | 2 |
| ⑳ | VR nuts (E) | 8830000550 | 3 |
| ㉑ | PH M2×6 ZK | 8810004860 | 2 |
| ㉒ | Connector seal | 8930012420 | 1 |
| ㉓ | 575 Top panel-1 (IC-32A/AT) | 8210003200 | 1 |
| | 575 Top panel (A)-1 (IC-32E) | 8210003210 | 1 |
| ㉔ | Top seal | 8930012390 | 1 |
| ㉕ | Seal plate | 8930012300 | 1 |
| ㉖ | PH No. 0-3 M1.4×3.5 ZK | 8810001710 | 1 |
| ㉗ | PH No. 0-1 M2×2.5 | 8810004870 | 2 |
| ㉘ | LCD holder | 8930012190 | 1 |
| ㉙ | LCD reflector | 6910002060 | 1 |
| ㉚ | PH M2×4 Ni FE | 8810005320 | 4 |
| ㉛ | PH M2×3 Ni FE | 8810004950 | 5 |
| ㉜ | 573 standoff | 8930012081 | 4 |
| ㉝ | PH M2×3 Ni FE | 8810004950 | 1 |
| ㉞ | PH M2.6×10 Ni | 8810004730 | 2 |
| ㉟ | Plate | 8930012280 | 1 |
| ㉟ | Screw lug M2 | 8860000010 | 2 |
| ㉟ | Contact holder | 8930011880 | 1 |
| ㉟ | BuH M2×6 Ni BS | 8810002580 | 1 |
| ㉟ | Latch plate (B) | 8930013430 | 1 |
| ㉟ | Sliding guide | 8010006990 | 1 |
| ㉟ | FH M2×4 Ni BS | 8810002310 | 4 |
| ㉟ | Release button (A) | 8930008610 | 1 |
| ㉟ | PH M2×5 Ni | 8810005310 | 1 |
| ㉟ | Connection spring | 8930005980 | 1 |

Screw type Screw: M2×3, etc. Self-tapping screw: B0 2×15, etc. Precision type screw: No. 0-1, etc.
Screw head style PH: Pan head FH: Flat head BuH: Button head

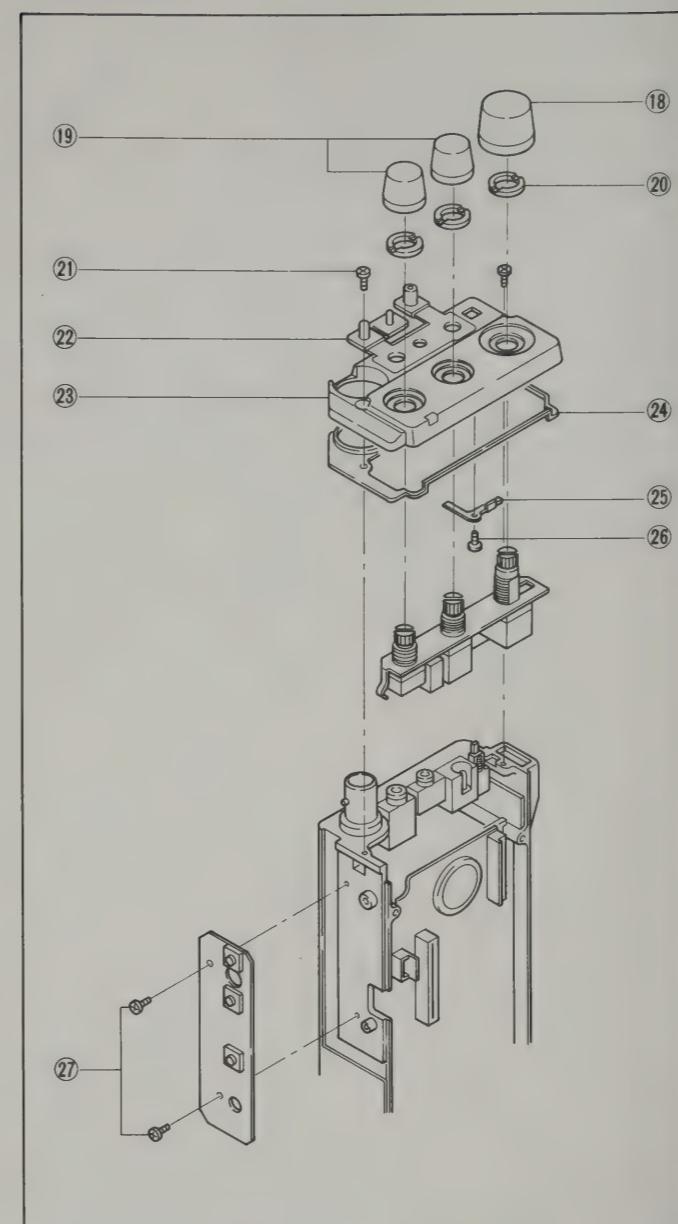
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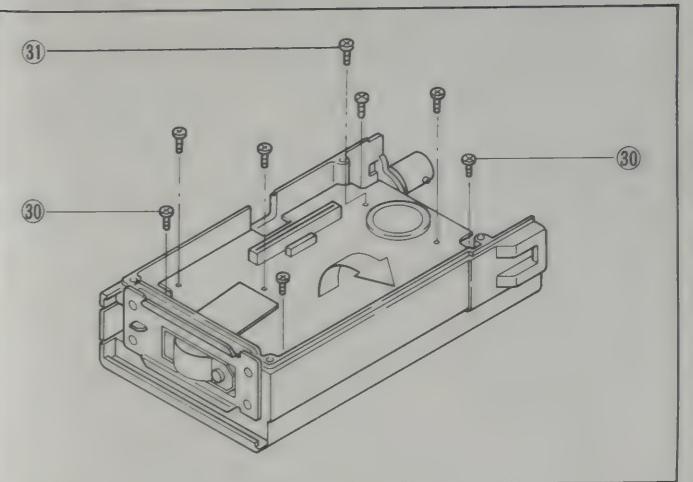
• LOGIC UNIT



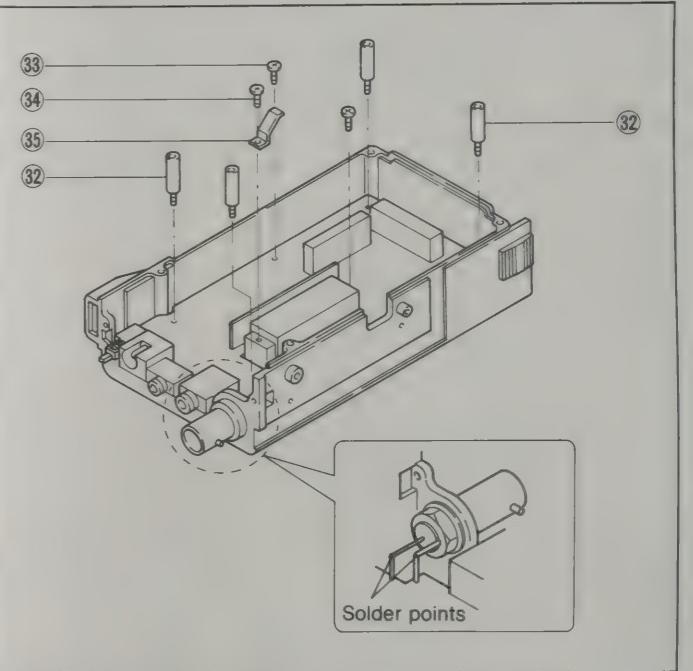
• TOP PANEL



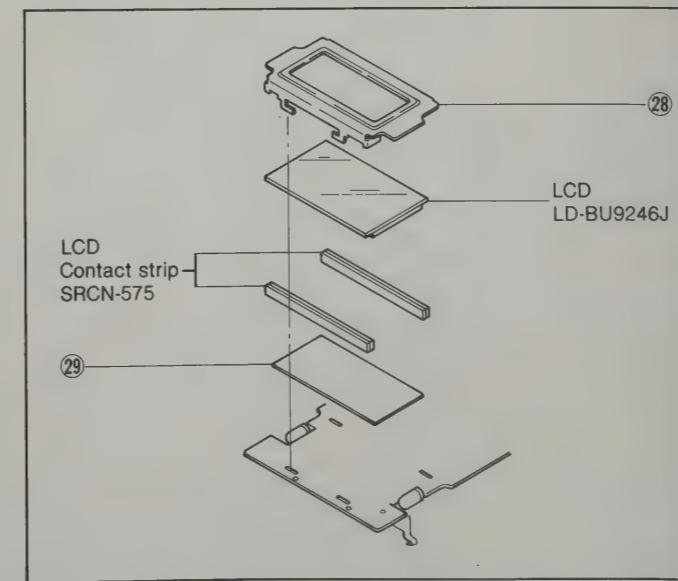
• MAIN UNIT



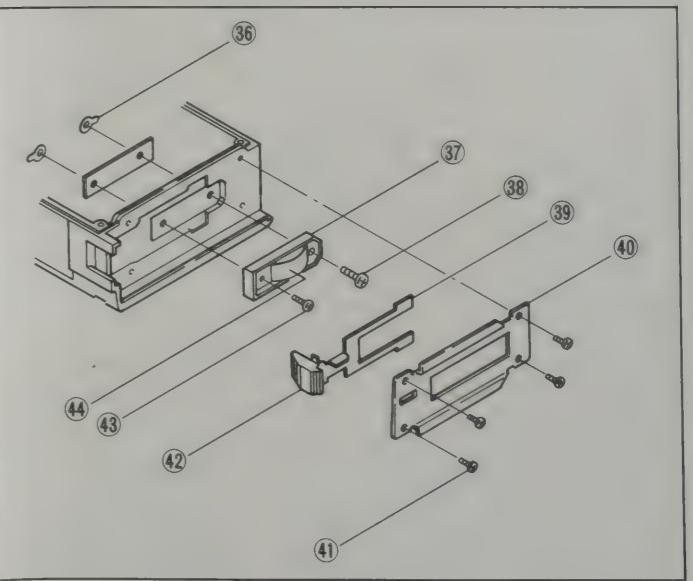
• RF UNIT



• LCD

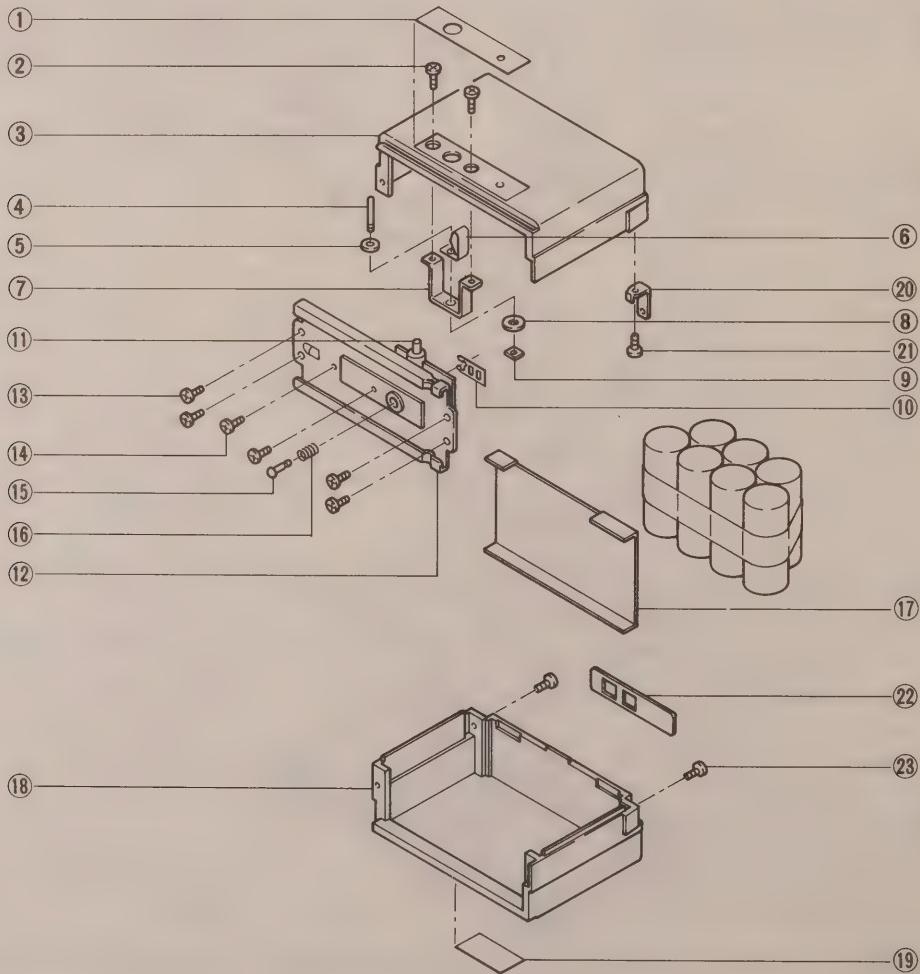


• CONTACT HOLDER



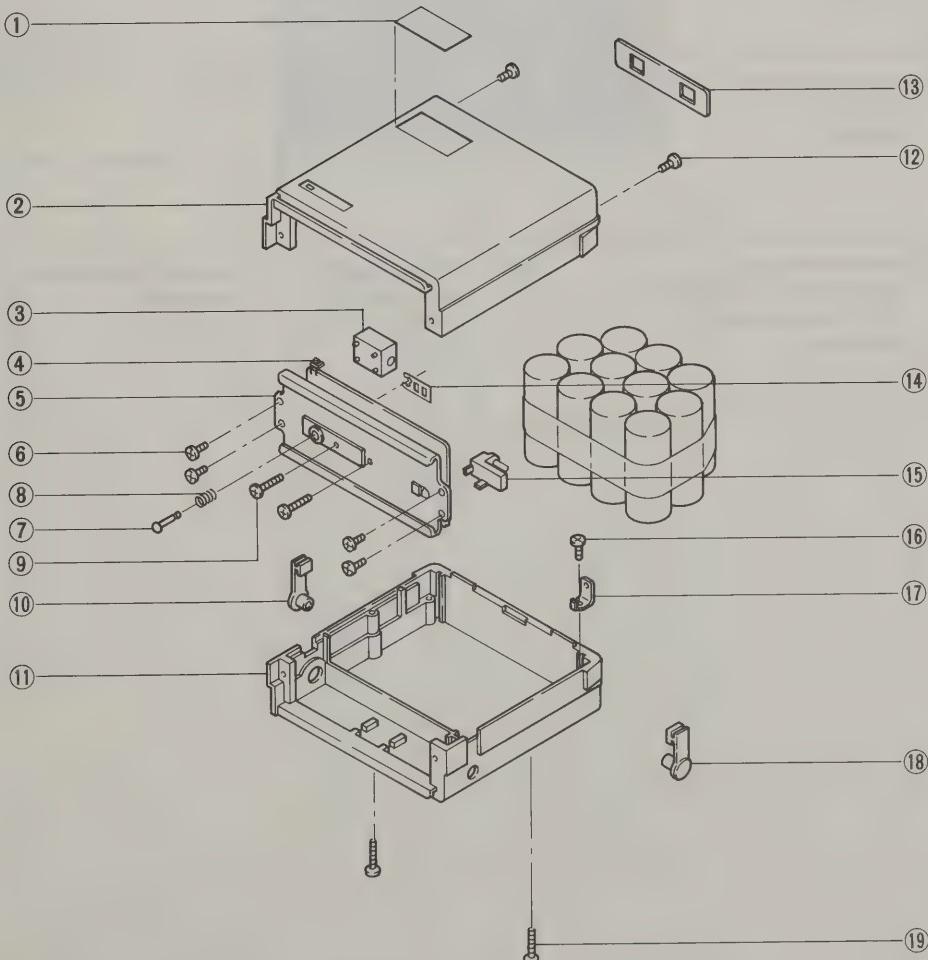
• BP-3

| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|----------------------------------|-----------------|------|
| ① | Rear plate (A) | 8310004260 | 1 |
| ② | FH M2 × 5 | 8810002060 | 2 |
| ③ | Rear case (3) F (supplied BP-3) | 8010002300 | 1 |
| ④ | Rear case (3) B (optional BP-3) | 8010002780 | 1 |
| ⑤ | Charging jack metal (A) | 8930005740 | 1 |
| ⑥ | Isolating washer (J) | 8850000850 | 1 |
| ⑦ | Charger jack metal (B) | 8930005750 | 1 |
| ⑧ | Charger jack metal (C) | 8930006130 | 1 |
| ⑨ | Isolating washer | 8850000310 | 1 |
| ⑩ | Square nut | 8930007370 | 1 |
| ⑪ | Plate spring | 8930004670 | 1 |
| ⑫ | LED (SCLC26UR) | 5040000160 | 1 |
| ⑬ | Sliding metal (D) | 8930007220 | 1 |
| ⑭ | PH B0 2 × 4 | 8810000980 | 4 |
| ⑮ | FFH M2 × 8 | 8810004660 | 2 |
| ⑯ | Charger terminal (D) | 8930006240 | 1 |
| ⑰ | Spring (A) | 8930007220 | 1 |
| ⑱ | Isolating seat | 8930005400 | 1 |
| ⑲ | Front case (3) E (supplied BP-3) | 8010002290 | 1 |
| ⑳ | Front case (3) A (optional BP-3) | 8010002760 | 1 |
| ㉑ | Name plate | 8310002550 | 1 |
| ㉒ | Charging metal | 8010001920 | 2 |
| ㉓ | PH B0 2 × 4 | 8810000980 | 2 |
| ㉔ | Charging selector plate (B) | 8930002150 | 1 |
| ㉕ | FFH M2 × 4 Ni | 8810004671 | 2 |



• BP-5A, BP-7, BP-8, BP-70

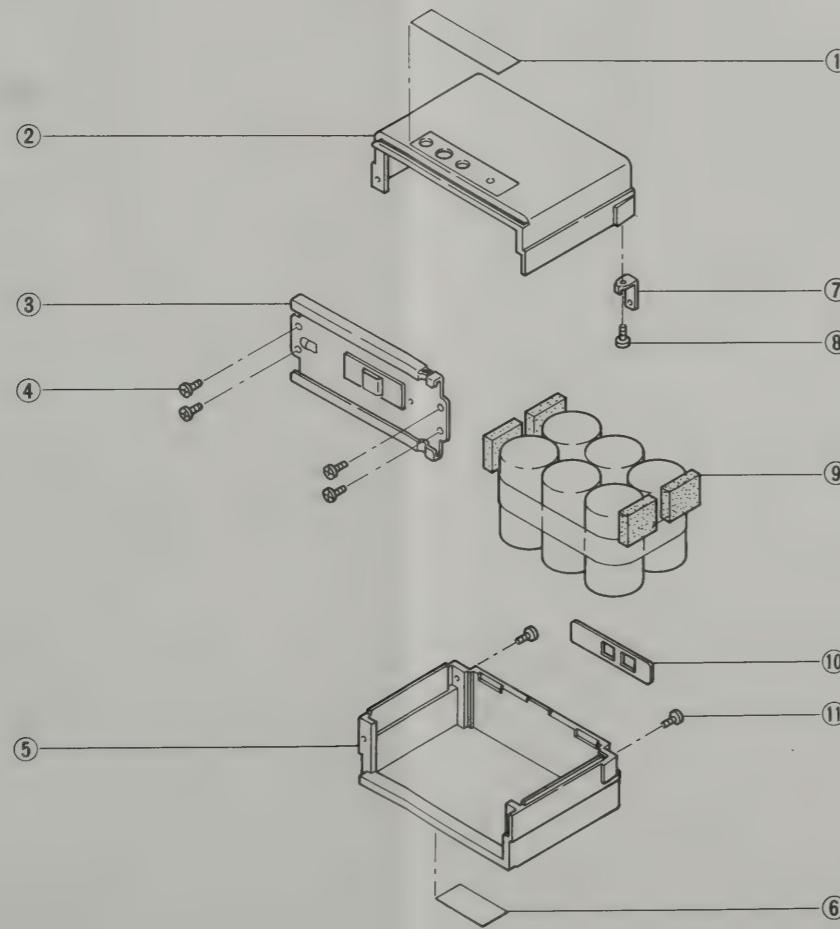
| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|---|-----------------|------|
| ① | Name plate BP-5A | 8310006970 | 1 |
| | Name plate BP-7 | 8310002580 | 1 |
| | Name plate BP-8 | 8310002590 | 1 |
| | Name plate BP-70 | 8310012080 | 1 |
| ② | Front case (7) A (BP-5A, BP-7, BP-8) | 8010002860 | 1 |
| | Front case (9) A (BP-70) | 8010007030 | 1 |
| ③ | Charge jack (A) HEC0779-01-030 | 6450000240 | 1 |
| ④ | LED (SLB23VR5F) | 5040000390 | 1 |
| ⑤ | Sliding metal (D) | 8930007220 | 1 |
| ⑥ | PH B0 2×4 | 8810000980 | 4 |
| ⑦ | Charging terminal (D) | 8930006240 | 1 |
| ⑧ | Spring (A) | 8930007220 | 1 |
| ⑨ | FFH M2×8 | 8810004660 | 2 |
| ⑩ | Rubber cap (for jack A) | 8930001740 | 1 |
| ⑪ | Rear case (7) B (BP-5A, BP-7, BP-8) | 8010002870 | 1 |
| | Rear case (9) B (BP-70) | 8010007040 | 1 |
| ⑫ | FFH M2×4 Ni | 8810004671 | 2 |
| ⑬ | Charging selector plate (B) (BP-5A, BP-7, BP-8) | 8930002150 | 1 |
| | Charging selector plate (C) (BP-70) | 8930012830 | 1 |
| ⑭ | Plate spring | 8930004670 | 1 |
| ⑮ | Charger jack (B) HEC1737-01-020 | 6450000230 | 1 |
| ⑯ | PH B0 2×4 | 8810000980 | 2 |
| ⑰ | Charging metal | 8010001920 | 2 |
| ⑱ | Rubber cap (for jack B) | 8930001750 | 1 |
| ⑲ | PH B0 2×15 ZK | 8810004910 | 2 |



5-2 BATTERY PACK

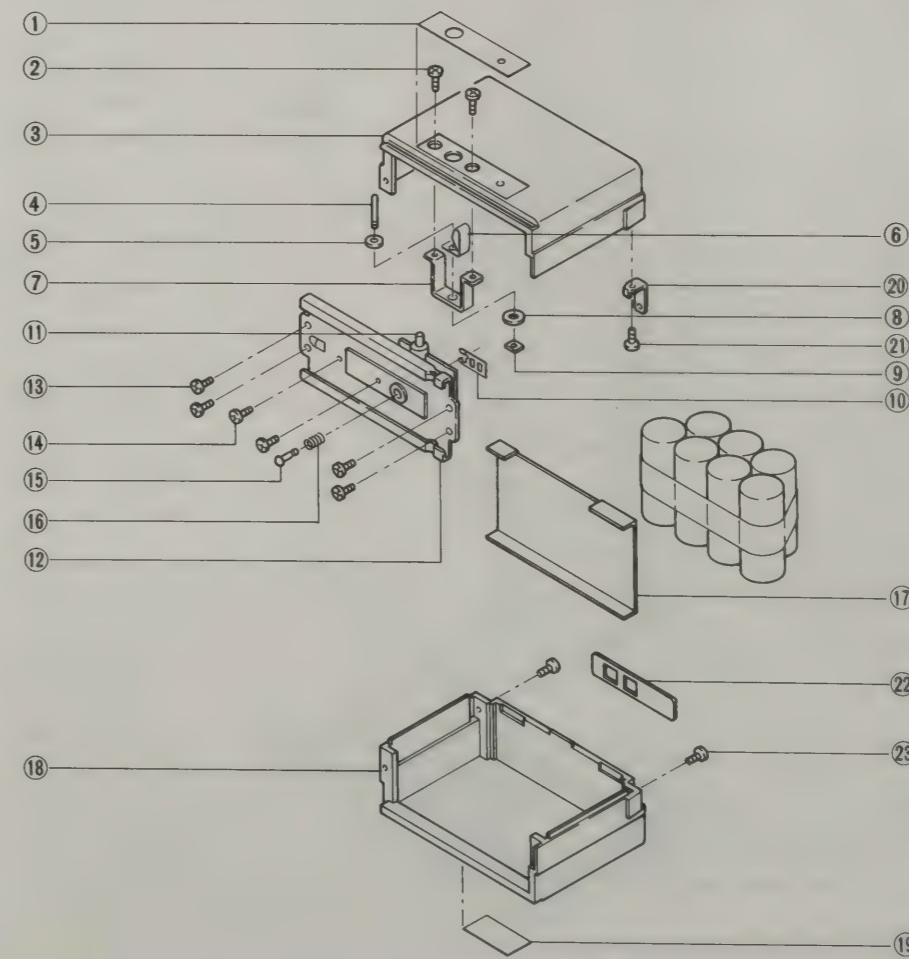
• BP-2 AND BP-5

| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|-----------------------------|-----------------|------|
| ① | Rear plate (B) | 8310004310 | 1 |
| ② | Rear case (3) B (BP-2) | 8010002780 | 1 |
| | Rear case (5) B (BP-5) | 8010002830 | 1 |
| ③ | Sliding metal (E) | 8010004230 | 1 |
| ④ | PH B0 2×4 | 8810000980 | 4 |
| ⑤ | Front case (3) A (BP-2) | 8010002760 | 1 |
| | Front case (5) A (BP-5) | 8010002820 | 1 |
| ⑥ | Name plate BP-2 | 8310002540 | 1 |
| | Name plate BP-5 | 8310002570 | 1 |
| ⑦ | Charging metal | 8010001920 | 2 |
| ⑧ | PH B0 2×4 | 8810000980 | 2 |
| ⑨ | Sponge (O) | 8930001440 | 4 |
| ⑩ | Charging selector plate (B) | 8930002150 | 1 |
| ⑪ | FFH M2×4 Ni | 8810004671 | 2 |



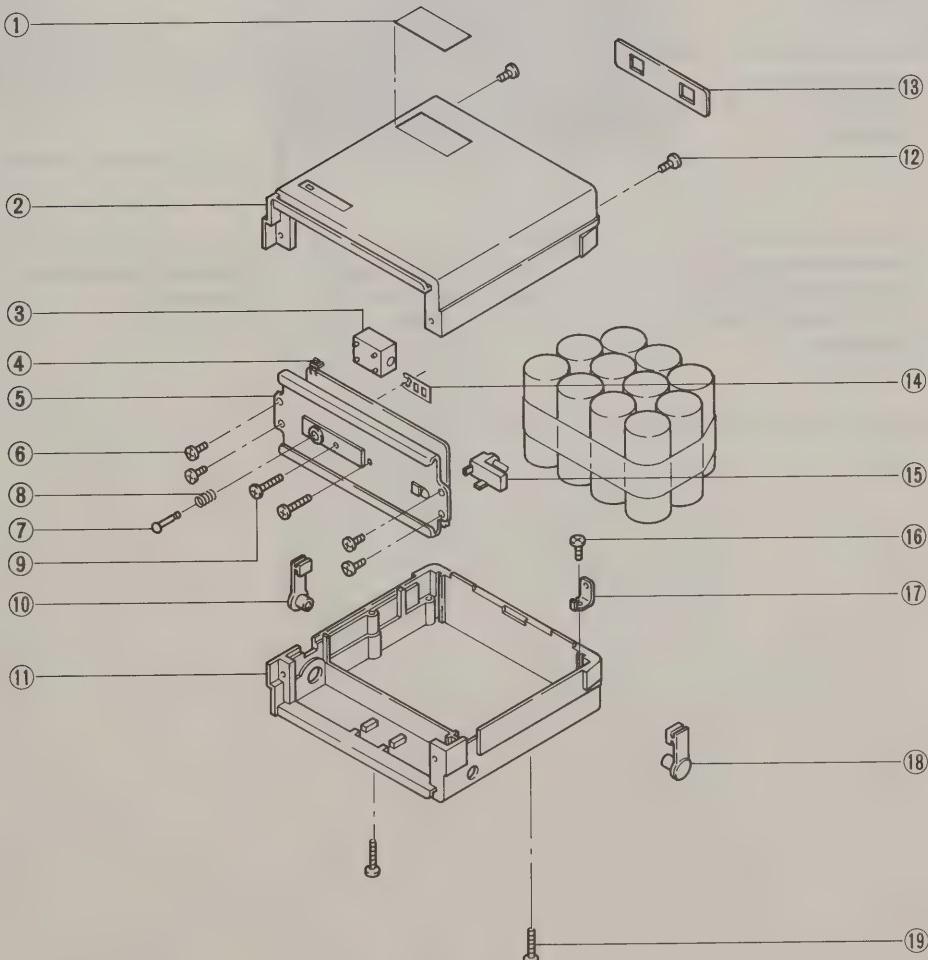
• BP-3

| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|----------------------------------|-----------------|------|
| ① | Rear plate (A) | 8310004260 | 1 |
| ② | FH M2×5 | 8810002060 | 2 |
| ③ | Rear case (3) F (supplied BP-3) | 8010002300 | 1 |
| | Rear case (3) B (optional BP-3) | 8010002780 | 1 |
| ④ | Charging jack metal (A) | 8930005740 | 1 |
| ⑤ | Isolating washer (J) | 8850000850 | 1 |
| ⑥ | Charger jack metal (B) | 8930005750 | 1 |
| ⑦ | Charger jack metal (C) | 8930006130 | 1 |
| ⑧ | Isolating washer | 8850000310 | 1 |
| ⑨ | Square nut | 8930007370 | 1 |
| ⑩ | Plate spring | 8930004670 | 1 |
| ⑪ | LED (SCLC26UR) | 5040000160 | 1 |
| ⑫ | Sliding metal (D) | 8930007220 | 1 |
| ⑬ | PH B0 2×4 | 8810000980 | 4 |
| ⑭ | FFH M2×8 | 8810004660 | 2 |
| ⑮ | Charger terminal (D) | 8930006240 | 1 |
| ⑯ | Spring (A) | 8930007220 | 1 |
| ⑰ | Isolating seat | 8930005400 | 1 |
| ⑱ | Front case (3) E (supplied BP-3) | 8010002290 | 1 |
| | Front case (3) A (optional BP-3) | 8010002760 | 1 |
| ⑲ | Name plate | 8310002550 | 1 |
| ⑳ | Charging metal | 8010001920 | 2 |
| ㉑ | PH B0 2×4 | 8810000980 | 2 |
| ㉒ | Charging selector plate (B) | 8930002150 | 1 |
| ㉓ | FFH M2×4 Ni | 8810004671 | 2 |



• BP-5A, BP-7, BP-8, BP-70

| LABELLED NUMBER | DESCRIPTION | ORDERING NUMBER | QTY. |
|-----------------|---|-----------------|------|
| ① | Name plate BP-5A | 8310006970 | 1 |
| | Name plate BP-7 | 8310002580 | 1 |
| | Name plate BP-8 | 8310002590 | 1 |
| | Name plate BP-70 | 8310012080 | 1 |
| ② | Front case (7) A (BP-5A, BP-7, BP-8) | 8010002860 | 1 |
| | Front case (9) A (BP-70) | 8010007030 | 1 |
| ③ | Charge jack (A) HEC0779-01-030 | 6450000240 | 1 |
| ④ | LED (SLB23VR5F) | 5040000390 | 1 |
| ⑤ | Sliding metal (D) | 8930007220 | 1 |
| ⑥ | PH B0 2×4 | 8810000980 | 4 |
| ⑦ | Charging terminal (D) | 8930006240 | 1 |
| ⑧ | Spring (A) | 8930007220 | 1 |
| ⑨ | FFH M2×8 | 8810004660 | 2 |
| ⑩ | Rubber cap (for jack A) | 8930001740 | 1 |
| ⑪ | Rear case (7) B (BP-5A, BP-7, BP-8) | 8010002870 | 1 |
| | Rear case (9) B (BP-70) | 8010007040 | 1 |
| ⑫ | FFH M2×4 Ni | 8810004671 | 2 |
| ⑬ | Charging selector plate (B) (BP-5A, BP-7, BP-8) | 8930002150 | 1 |
| | Charging selector plate (C) (BP-70) | 8930012830 | 1 |
| ⑭ | Plate spring | 8930004670 | 1 |
| ⑮ | Charger jack (B) HEC1737-01-020 | 6450000230 | 1 |
| ⑯ | PH B0 2×4 | 8810000980 | 2 |
| ⑰ | Charging metal | 8010001920 | 2 |
| ⑱ | Rubber cap (for jack B) | 8930001750 | 1 |
| ⑲ | PH B0 2×15 ZK | 8810004910 | 2 |

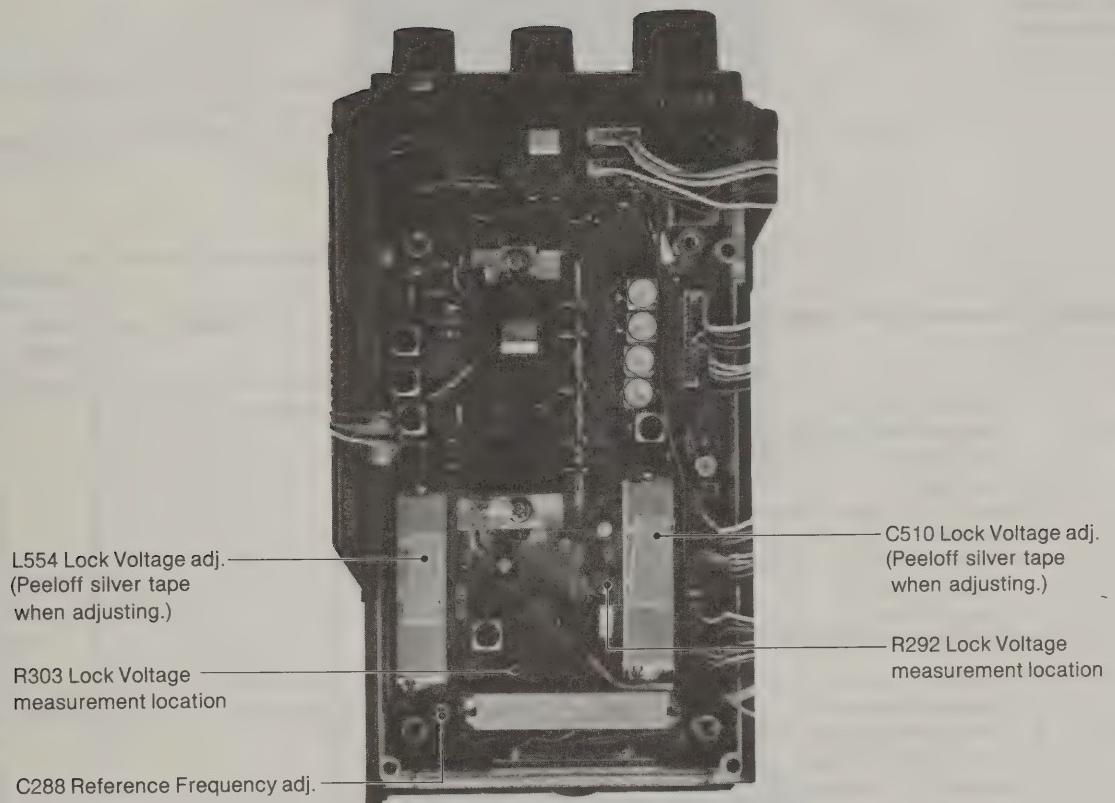


SECTION 6 MAINTENANCE AND ADJUSTMENT

6-1 PLL ADJUSTMENT

| TEST INSTRUMENTS REQUIRED | | MEASUREMENT CONNECTION LOCATION | | | | |
|---------------------------|-----------------------|---------------------------------|--|----------------------------------|------------------|--------|
| ADJUSTMENT | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
| | | UNIT | LOCATION | | UNIT | ADJUST |
| LOCK VOLTAGE | 1 | RF | Connect the DC voltmeter to R292. | 1.2 V | U-VCO | C510 |
| | 2 | RF | Connect the DC voltmeter to R303. | 1.5 V | V-VCO | L554 |
| REFERENCE FREQUENCY | 1 | Top panel | Loose couple the frequency counter to the antenna connector. | Same as the displayed frequency. | RF | C288 |

RF UNIT

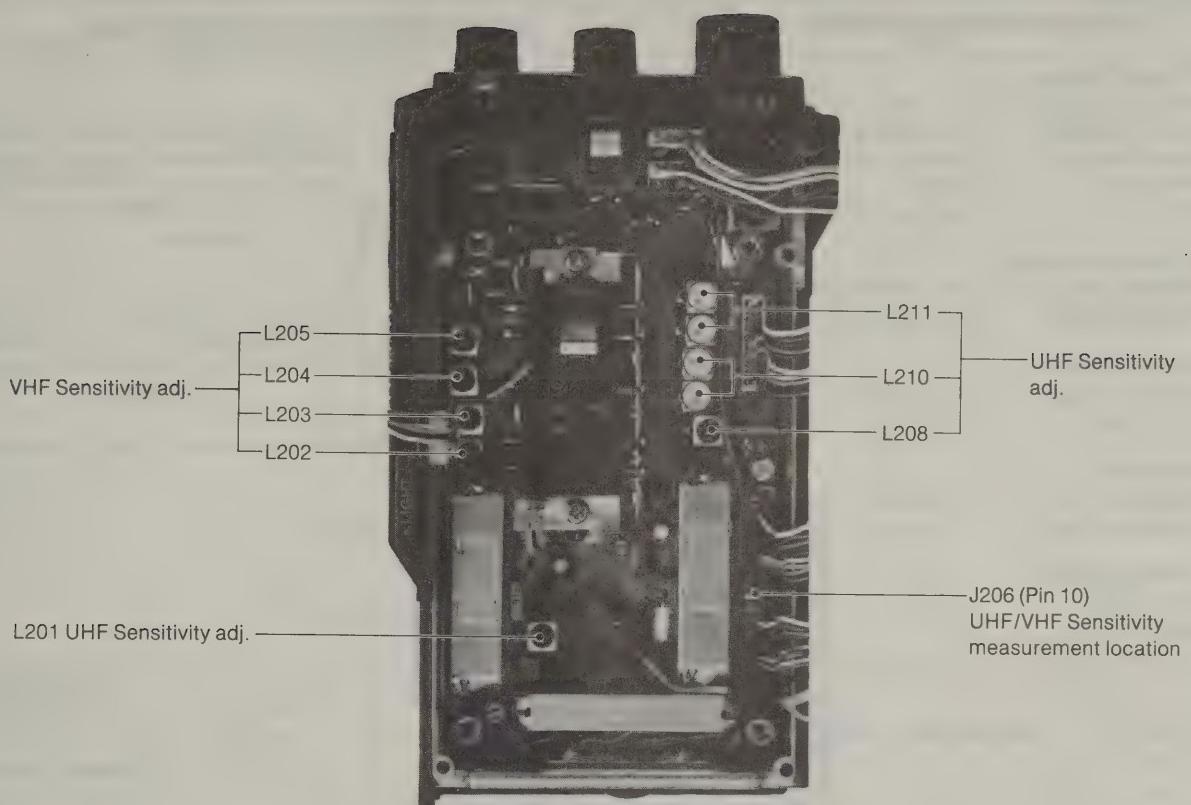


6-2 RECEIVER ADJUSTMENT

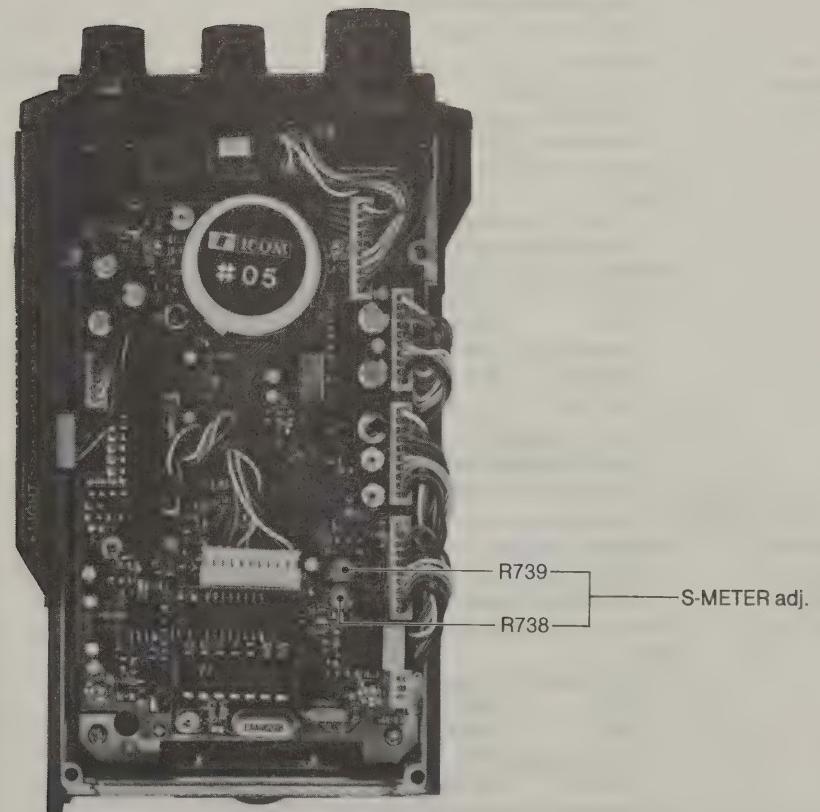
| TEST INSTRUMENTS REQUIRED | | MEASUREMENT CONNECTION LOCATION | | | | | |
|---------------------------|-----------------------|--|------------------|--|------------------|--------|--|
| | | | | | | | |
| ADJUSTMENT | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | | |
| | | UNIT | LOCATION | | UNIT | ADJUST | |
| UHF SENSITIVITY | 1 | <ul style="list-style-type: none"> Frequency display: 432.00 MHz (except U.S.A.) 442.00 MHz (U.S.A.) Receiving Apply an RF signal to the antenna connector. Level: -87 dBm (10.0 µV) Dev. : ±3.5 kHz Mod. : 1 kHz [SQL] control: Max. CCW* | RF | Connect the DC voltmeter to J206 pin 10. | Maximum | RF | Adjust in sequence L211 L210 L208 L201 |
| VHF SENSITIVITY | 1 | <ul style="list-style-type: none"> Frequency display: 146.00 MHz (except Europe) 145.00 MHz (Europe) Apply an RF signal to the antenna connector. Level: -81 dBm (20.0 µV) Dev. : ±3.5 kHz Mod. : 1 kHz | RF | Connect the DC voltmeter to J206 pin 10. | Maximum | RF | Adjust in sequence L205 L204 L203 L202 |
| S-METER | 1 | <ul style="list-style-type: none"> Frequency display: 435.00 MHz (except U.S.A.) 445.00 MHz (U.S.A.) Apply an RF signal to the antenna connector. Level: -107 dBm (1.0 µV) Dev. : ±3.5 kHz Mod. : 1 kHz | FUNCTION DISPLAY | S/RF INDICATOR | 2 dots | MAIN | R738 |
| | 2 | <ul style="list-style-type: none"> Frequency display: 146.00 MHz (except Europe) 145.00 MHz (Europe) Apply an RF signal to the antenna connector. Level: -101 dBm (2.0 µV) Dev. : ±3.5 kHz Mod. : 1 kHz | | | | | R739 |

* CCW: Counterclockwise

RF UNIT



MAIN UNIT



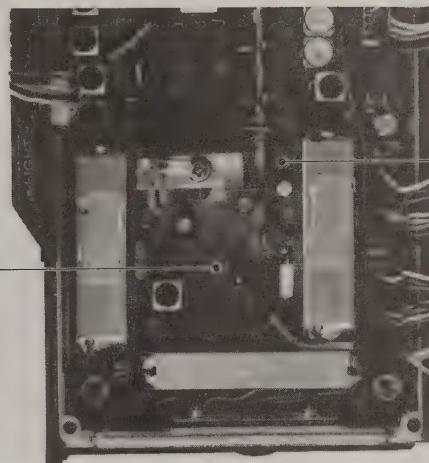
6-3 TRANSMITTER ADJUSTMENT

| TEST INSTRUMENTS REQUIRED | | | MEASUREMENT CONNECTION LOCATION | | | | |
|--|---|---|---------------------------------|--|-----------|------------------|--------|
| ADJUSTMENT | | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
| | | | UNIT | LOCATION | | UNIT | ADJUST |
| OUTPUT POWER | 1 | <ul style="list-style-type: none"> Frequency display: 435.00 MHz (except U.S.A.) 445.00 MHz (U.S.A.) [H/L] switch: High Transmitting | Top panel | Connect the RF power meter to the antenna connector. | 5.0 W | RF | R314 |
| | 2 | <ul style="list-style-type: none"> Frequency display: 146.00 MHz (except Europe) 145.00 MHz (Europe) | | | 5.5 W | | R320 |
| DEVIATION | 1 | <ul style="list-style-type: none"> Frequency display: 435.00 MHz (except U.S.A.) 445.00 MHz (U.S.A.) Apply an AF signal to the [MIC] jack. 50 mV/1 kHz (except U.S.A.) 110 mV/1 kHz (U.S.A.) Set the deviation meter. HPF : 50 Hz LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 | Top panel | Connect the deviation meter to the antenna connector via the attenuator. | ±4.8 kHz | MAIN | R779 |
| | 2 | <ul style="list-style-type: none"> Frequency display: 146.00 MHz (except Europe) 145.00 MHz (Europe) | | | ±4.8 kHz | | R781 |
| SUBAUDIBLE TONE DEVIATION (IC-32AT only) | 1 | <ul style="list-style-type: none"> Frequency display: 445.00 MHz (U.S.A.) 435.00 MHz (Asia) Apply no AF signal to the [MIC] jack. Set the deviation meter. HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 Set the tone frequency to 88.5 Hz. | Top panel | Connect the deviation meter to the antenna connector via the attenuator. | ±0.75 kHz | TONE | R601 |

TRANSMITTER ADJUSTMENT (CONTINUED)

| ADJUSTMENT | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
|---------------------------------------|--|-------------|--|----------|------------------|--------|
| | | UNIT | LOCATION | | UNIT | ADJUST |
| DTMF TONE DEVIATION (IC-32AT only) | 1 • Frequency display: 445.00 MHz (U.S.A.) 435.00 MHz (Asia) • Push and hold the [D] key while transmitting. | Top panel | Connect the deviation meter to the antenna connector via the attenuator. | ±3.5 kHz | MAIN | R751 |
| TONE CALL DEVIATION (IC-32E only) | 1 • Frequency display: 435.00 MHz • Push and hold the [T. CALL] switch. | Top panel | Connect the deviation meter to the antenna connector via the attenuator. | ±3.5 kHz | MAIN | R748 |

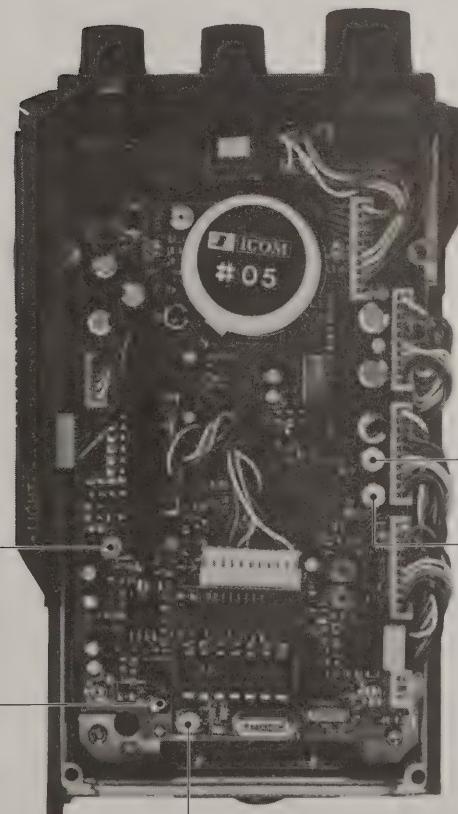
RF UNIT



R314 Output Power adj.

R320 Output Power adj.

MAIN UNIT



R779

Deviation adj.

R781

R751 DTMF Tone Deviation adj.

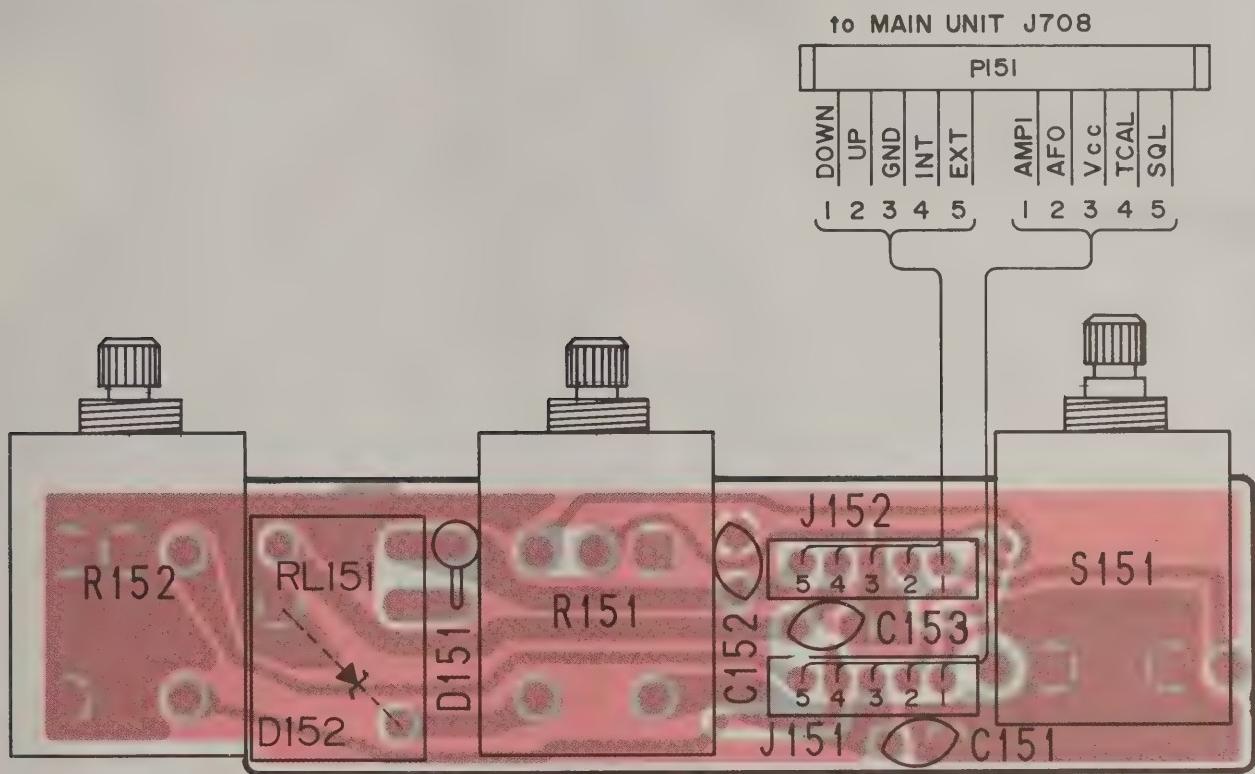
R748 Tone Call Deviation adj.
(IC-32E only)

R601 Subaudible Tone Deviation adj.

The above pictures show the IC-32AT.

SECTION 7 BOARD LAYOUTS

7-1 EF UNIT



SQUELCH

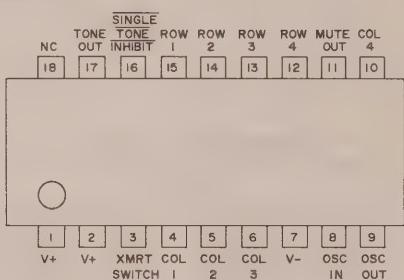
PWR / VOL

MAIN DIAL

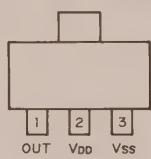
FOIL SIDE
COMPONENT SIDE

7-2 LOGIC UNIT

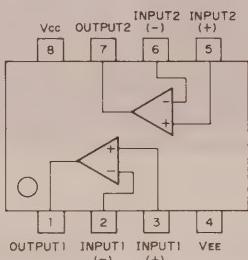
LR40872 (IC-32AT) IC901
(DTMF ENCODER)



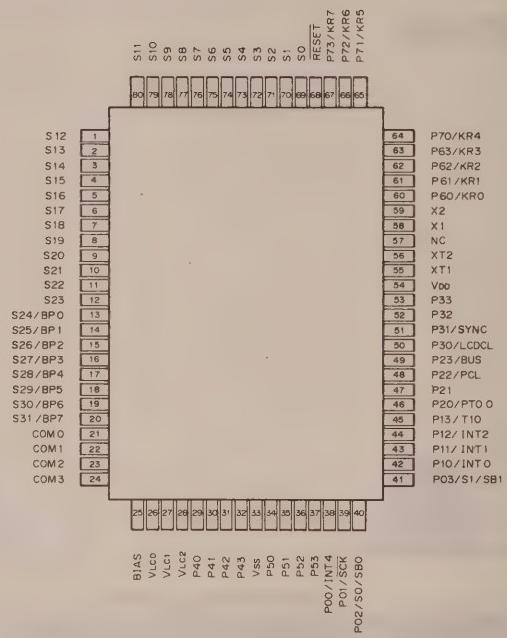
S-8054ALB-LM IC903
(RESET)



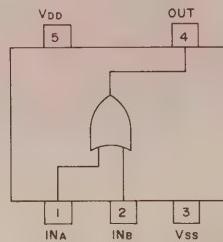
LA6393M IC904
(DUAL COMPARATOR)



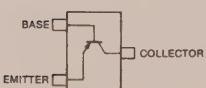
μPD75308GF-100-3B9 IC902
(CPU)



TC4S71F IC905, IC906
(OR GATE)



2SA1362 GR
Q908



Symbol: AEG

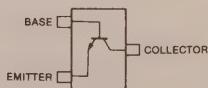
2SB798 DK
Q906



Symbol: DK

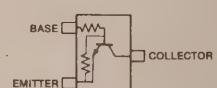
2SC4081 S
Q905, Q907,
Q910

2SC4081 S
(IC-32AT)
Q901, Q902,
Q903, Q904



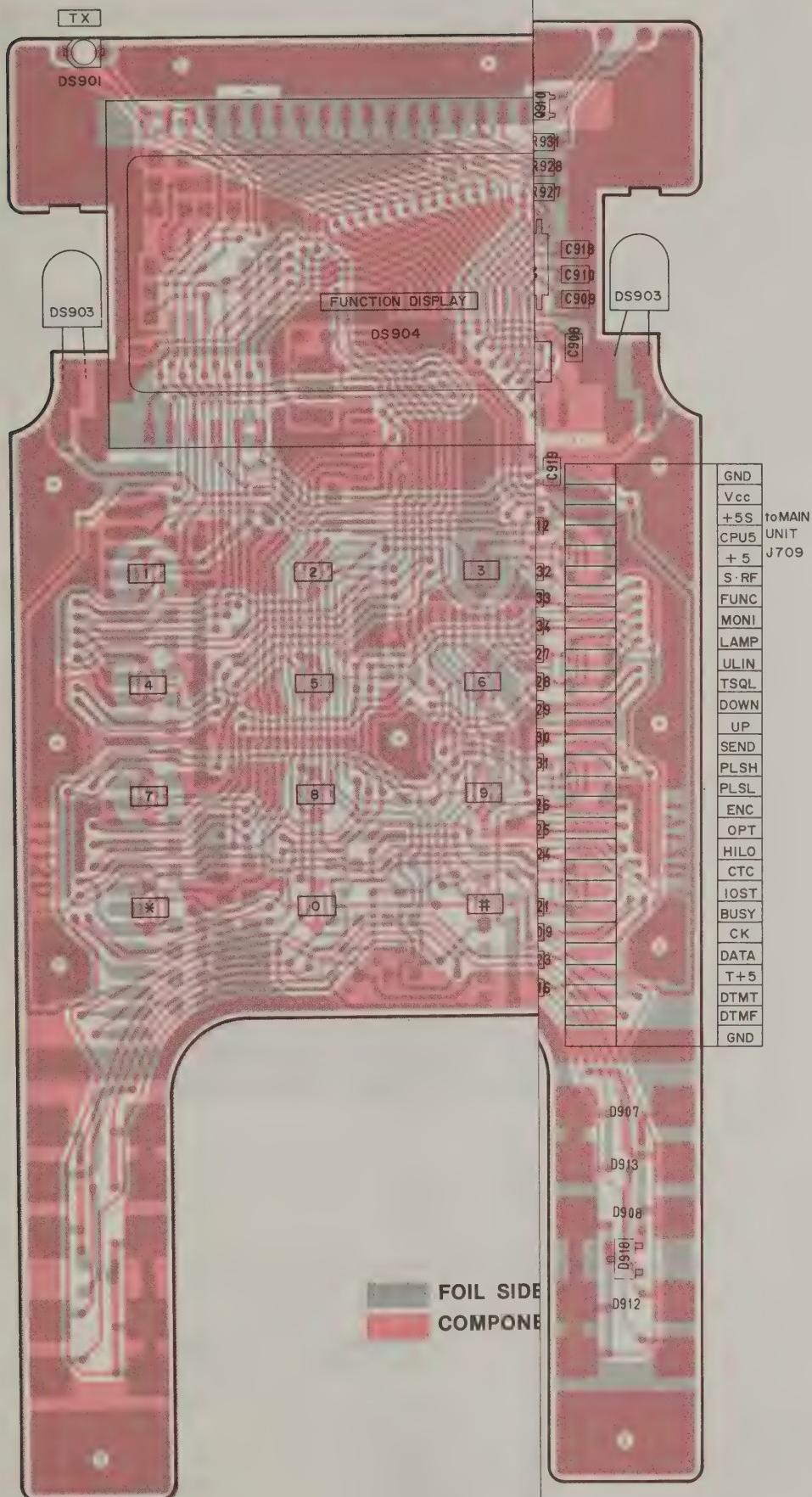
Symbol: BS

RN1404
Q909



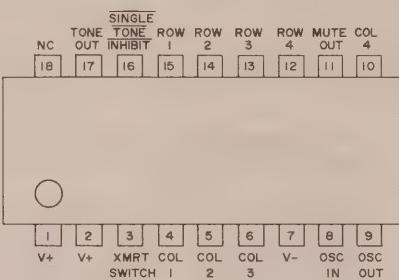
Symbol: XD

COMPONENT SIDE

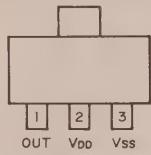


7-2 LOGIC UNIT

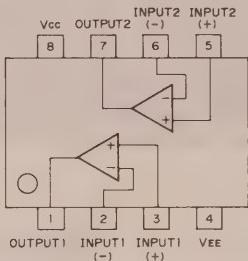
LR40872 (IC-32AT) IC901
(DTMF ENCODER)



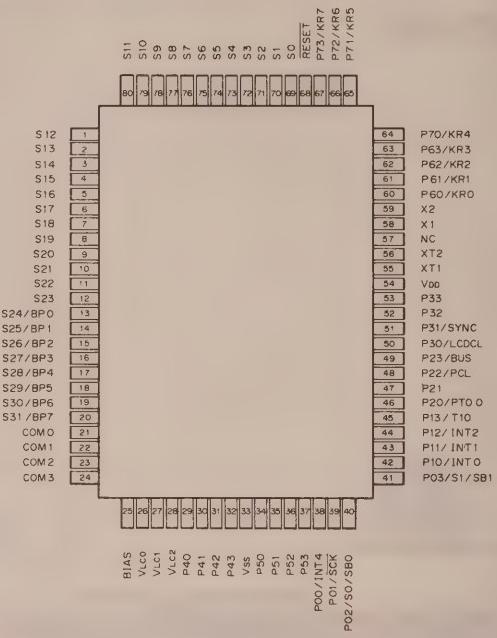
S-8054ALB-LM IC903
(RESET)



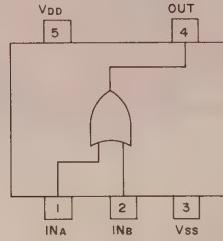
LA6393M IC904
(DUAL COMPARATOR)



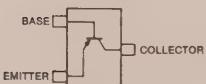
μPD75308GF-100-3B9 IC902
(CPU)



TC4S71F IC905, IC906
(OR GATE)



2SA1362 GR
Q908



Symbol: AEG

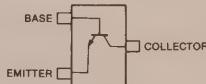
2SB798 DK
Q906



Symbol: DK

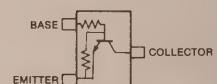
2SC4081 S
Q905, Q907,
Q910

2SC4081 S
(IC-32AT)
Q901, Q902,
Q903, Q904



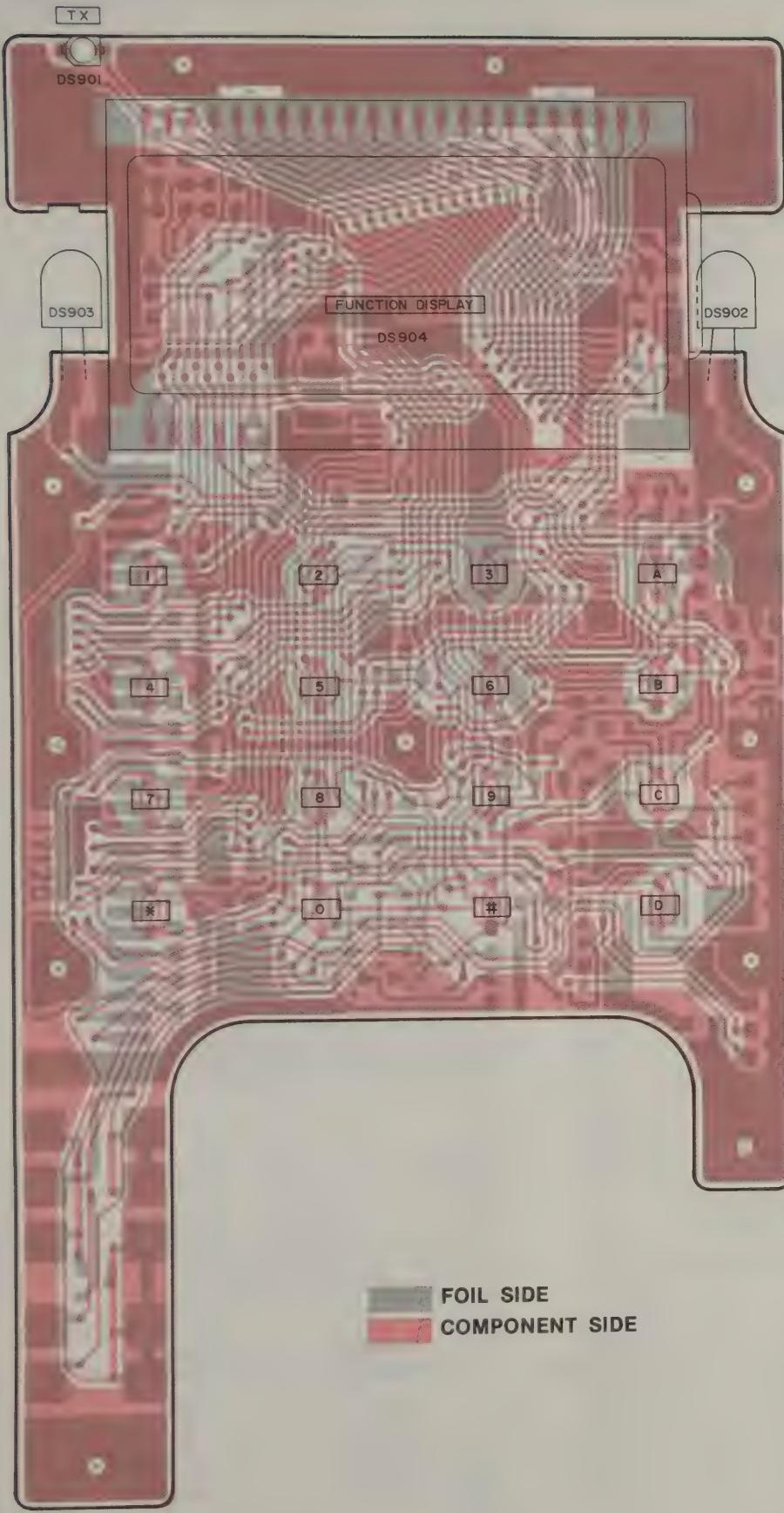
Symbol: BS

RN1404
Q909

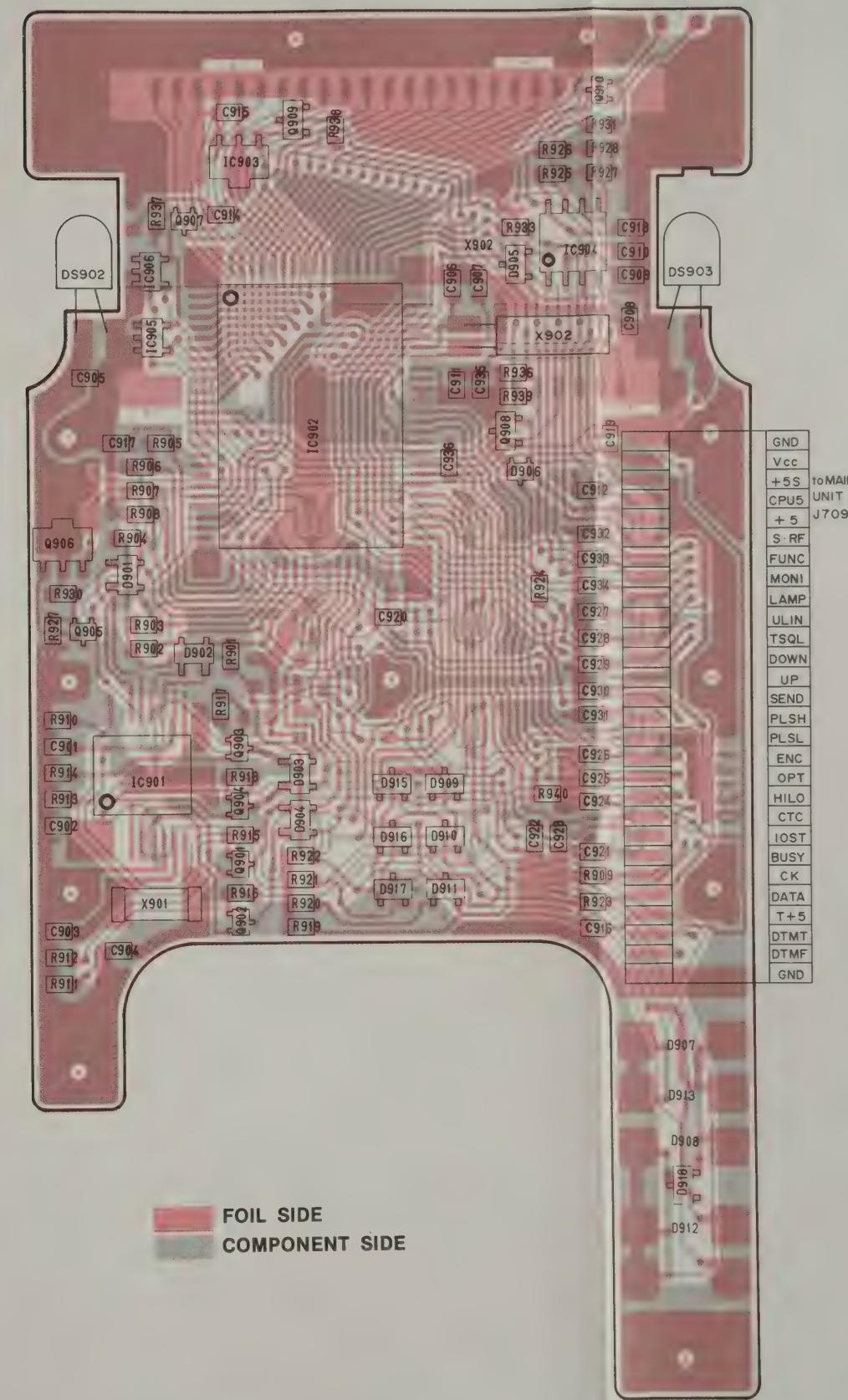


Symbol: XD

COMPONENT SIDE

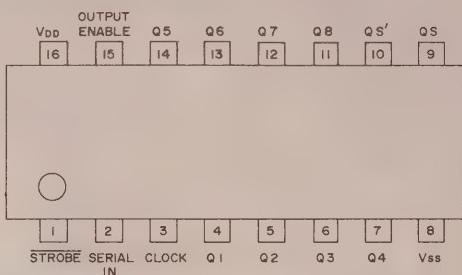


FOIL SIDE

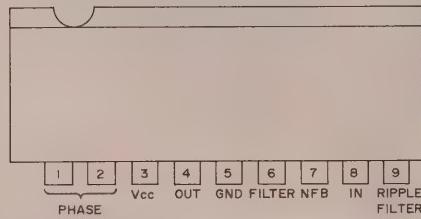


7-3 MAIN UNIT

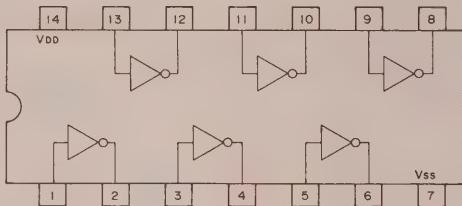
μPD4094BG IC701
(8-STAGE SHIFT AND STORE BUS REGISTER)



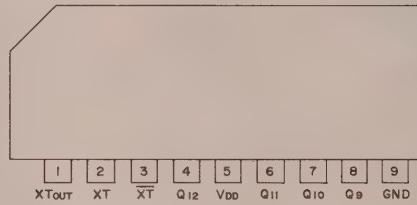
BA526 IC702
(AUDIO POWER AMP)



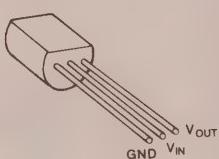
μPD4096UBG IC703
(HEX INVERTER)



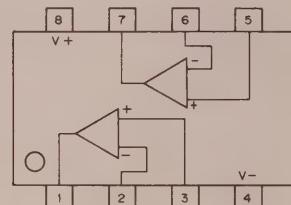
TC5082P-G (IC-32E) IC704
(OSCILLATOR AND 12 STAGE DIVIDER)



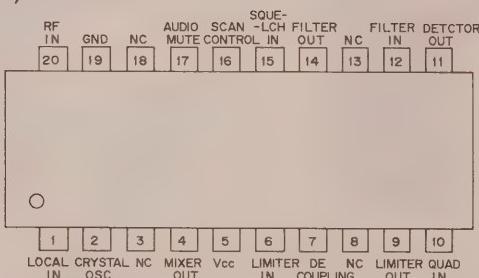
S81250HG IC705
(3-Terminal 5 V REGULATOR)



M5218FP IC706
(LOW NOISE DUAL OPERATIONAL AMPLIFIER)



TK10420M IC707
(FM IF IC)

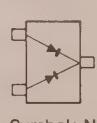


1SS187
D704



Symbol: D3

DAN202U
D701, D702,
D707, D709,
D710, D711,
D712 (IC-32E),
D714, D716



Symbol: N

DAP202U
D713 (IC-32AT)



Symbol: P

HSM88AS
D703, D705



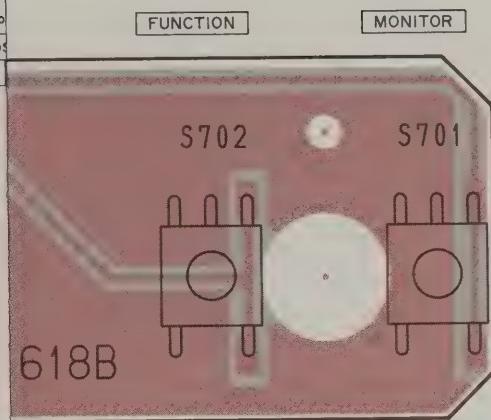
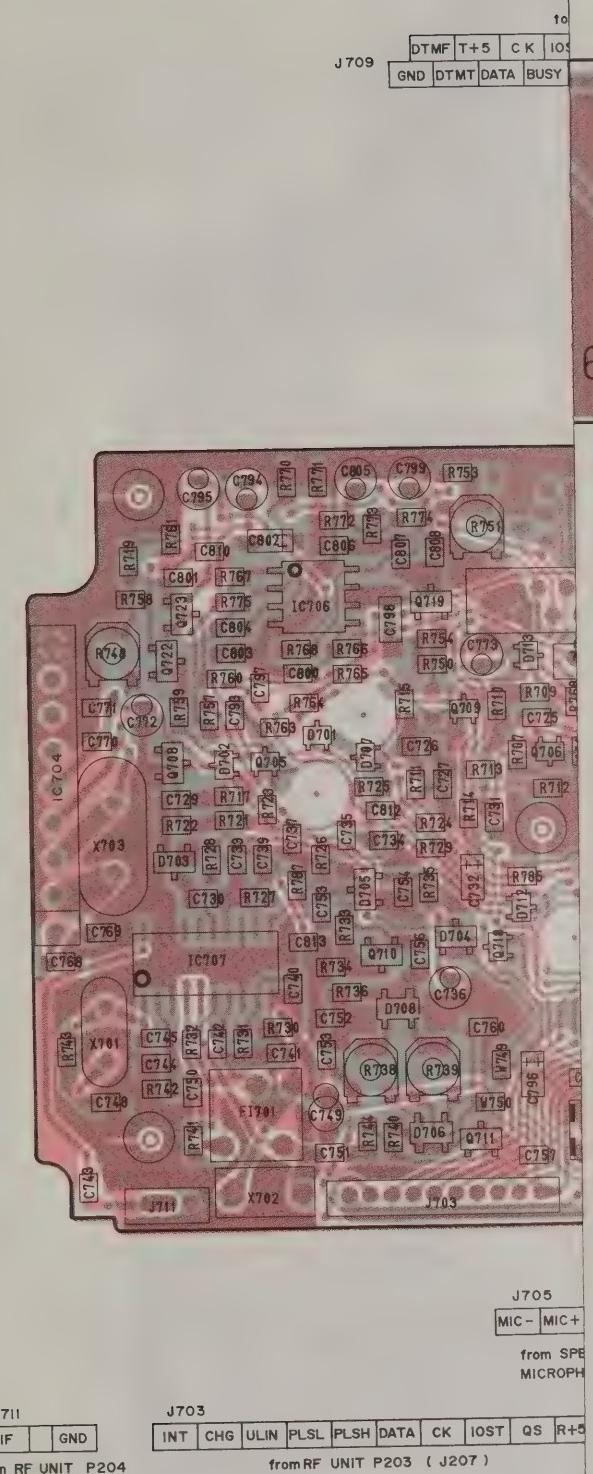
Symbol: C1

MA862
D706, D708



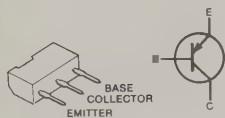
Symbol: M11

• MAIN UNIT

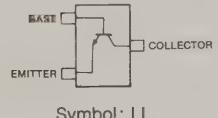


FOIL SIDE
COMPONENT SIDE

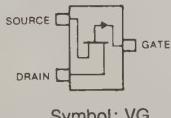
2SB909M R
Q701, Q712,
Q714



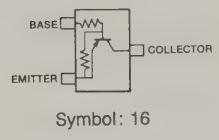
2SC2712 BL
Q708,
Q719 (IC-32AT)



2SJ106 GR
Q703, Q722,
Q723



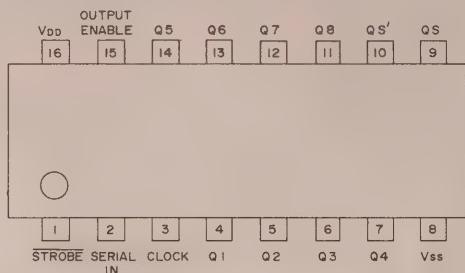
DTA144EU
Q718 (IC-32E)



7-3 MAIN UNIT

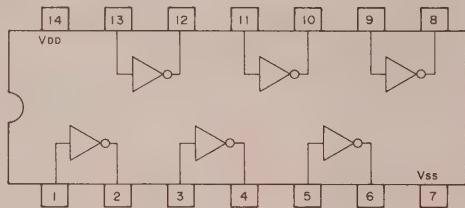
μPD4094BG IC701

(8-STAGE SHIFT AND STORE BUS REGISTER)



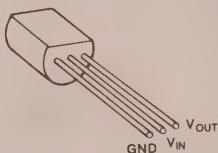
μPD4096UBG IC703

(HEX INVERTER)



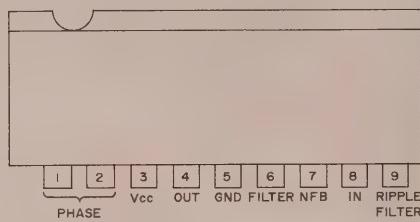
S81250HG IC705

(3-TERMINAL 5 V REGULATOR)



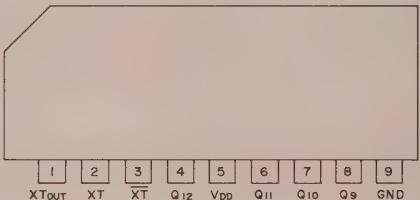
BA526 IC702

(AUDIO POWER AMP)



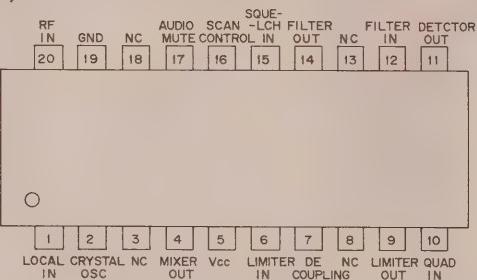
TC5082P-G (IC-32E) IC704

(OSCILLATOR AND 12 STAGE DIVIDER)



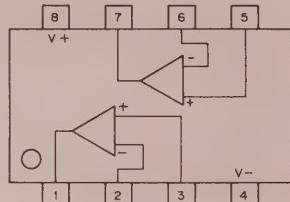
TK10420M IC707

(FM IF IC)



M5218FP IC706

(LOW NOISE DUAL OPERATIONAL AMPLIFIER)

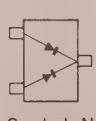


**1SS187
D704**



Symbol: D3

**DAN202U
D701, D702,
D707, D709,
D710, D711,
D712 (IC-32E),
D714, D716**



Symbol: N

**DAP202U
D713 (IC-32AT)**



Symbol: P

**HSM88AS
D703, D705**



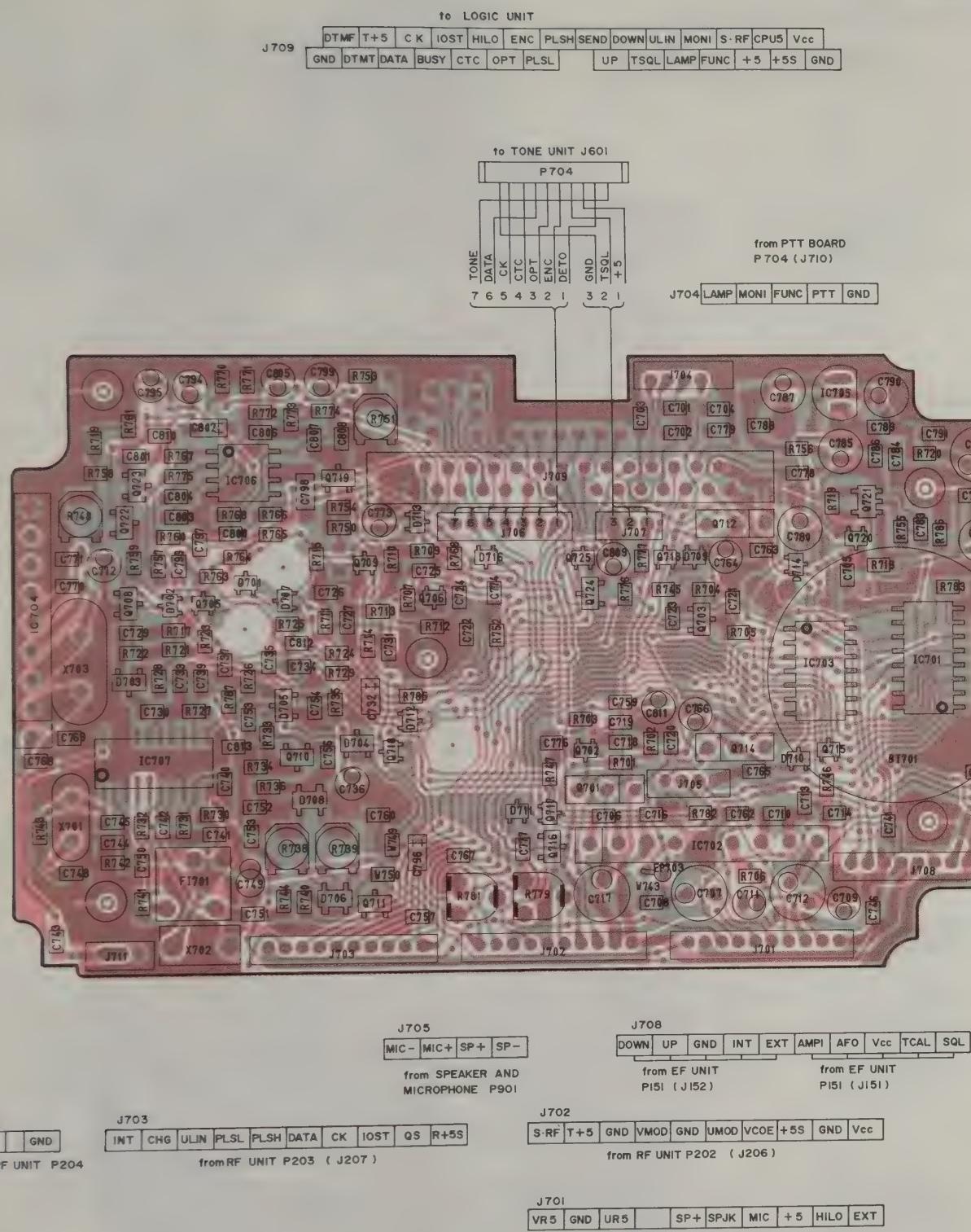
Symbol: C1

**MA862
D706, D708**



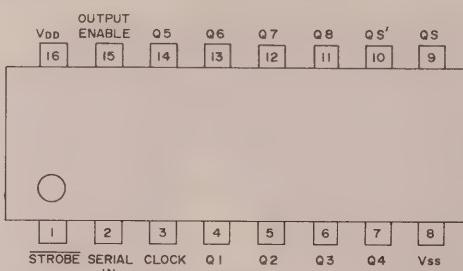
Symbol: M11

• MAIN UNIT

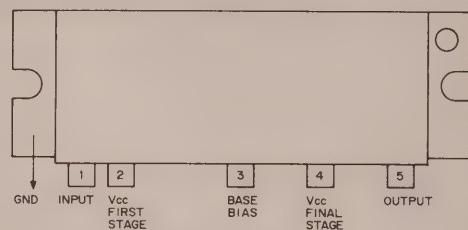


7-4 RF UNIT (1)

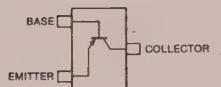
μPD4094BG IC202
(8-STAGE SHIFT AND STORE BUS REGISTER)



SC-1080 IC207
(POWER MODULE)



2SA1362 GR
Q207, Q208



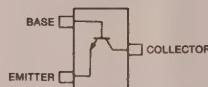
Symbol: AEG

2SB798 DK
Q226



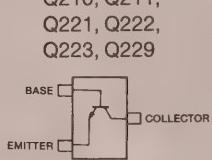
Symbol: DK

2SC3770 3
Q201



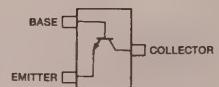
Symbol: JY3

2SC3772 3
Q203, Q209,
Q210, Q211,
Q221, Q222,
Q223, Q229



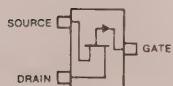
Symbol: LY3

2SC4081 S
Q227



Symbol: BS

2SJ106 GR
Q225



Symbol: VG

2SK209 BL
Q204



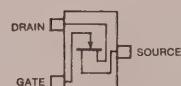
Symbol: XL

2SK209 Y
Q218



Symbol: XY

2SK302 Y
Q202



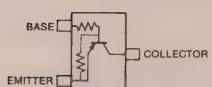
Symbol: TY

2SK536
Q215, Q216,
Q230, Q236



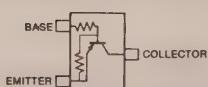
Symbol: CP

DTA144EU
Q244, Q250



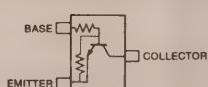
Symbol: 16

DTA144TU
Q245



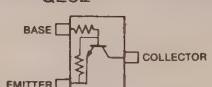
Symbol: 96

DTC124EU
Q247



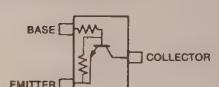
Symbol: 25

DTC144EU
Q243, Q251,
Q252



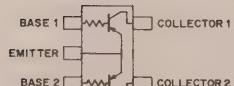
Symbol: 26

DTC144TU
Q233, Q242



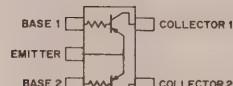
Symbol: 06

FMA3
Q231



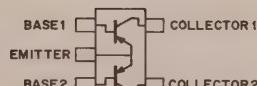
Symbol: A3

FM4
Q232



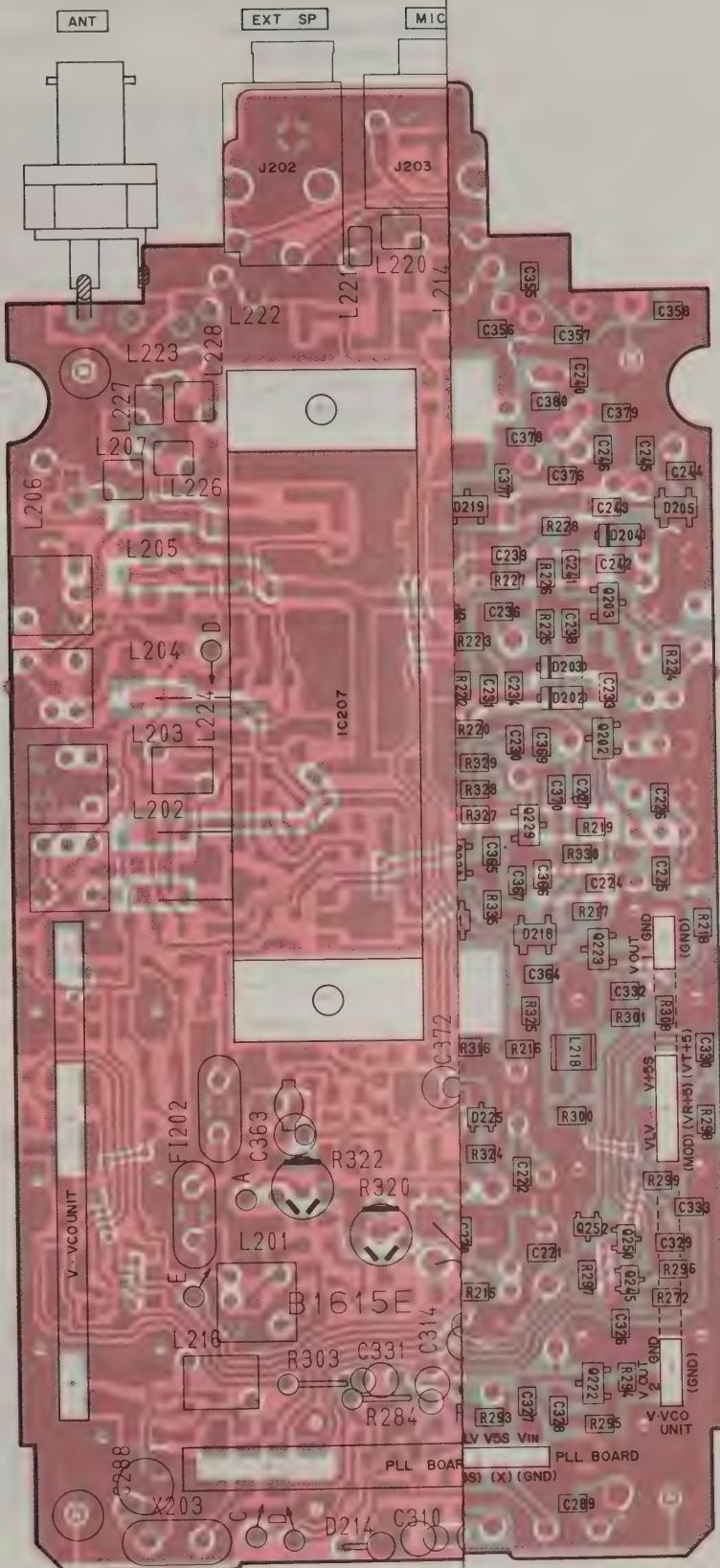
Symbol: A4

FMS1
Q228



Symbol: SI

COMPONENT SIDE



1SS153
D219, D223



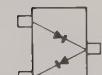
Symbol: A9

1SS154
D217



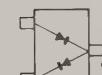
Symbol: BA

1SV172
D220



Symbol: BE

DA204U
D224



Symbol: K

DAN202U
D222, D225



Symbol: N

MA334 B
D202, D203,
D204



Symbol: 6D82

MA852

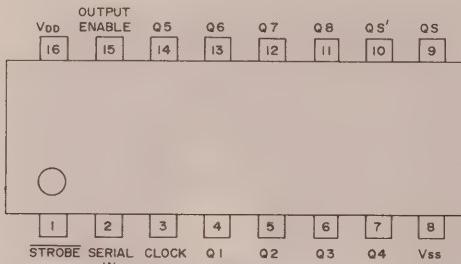
D201, D205,
D212, D215,
D216, D218



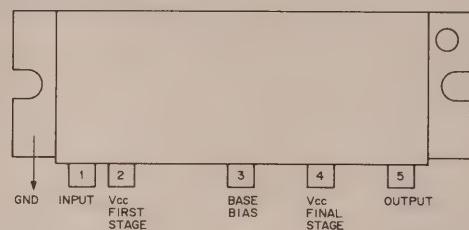
Symbol: M1I

7-4 RF UNIT (1)

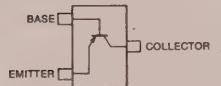
μPD4094BG IC202
(8-STAGE SHIFT AND STORE BUS REGISTER)



SC-1080 IC207
(POWER MODULE)

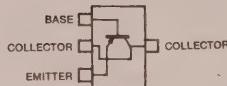


2SA1362 GR
Q207, Q208



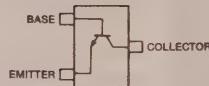
Symbol: AEG

2SB798 DK
Q226



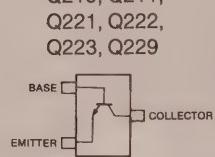
Symbol: DK

2SC3770 3
Q201



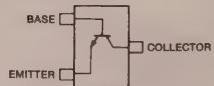
Symbol: JY3

2SC3772 3
Q203, Q209,
Q210, Q211,
Q221, Q222,
Q223, Q229



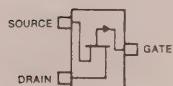
Symbol: LY3

2SC4081 S
Q227



Symbol: BS

2SJ106 GR
Q225



Symbol: VG

2SK209 BL
Q204



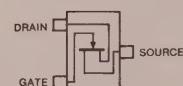
Symbol: XL

2SK209 Y
Q218



Symbol: XY

2SK302 Y
Q202



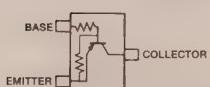
Symbol: TY

2SK536
Q215, Q216,
Q230, Q236



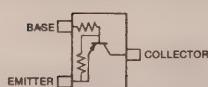
Symbol: CP

DTA144EU
Q244, Q250



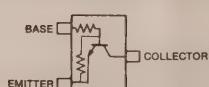
Symbol: 16

DTA144TU
Q245



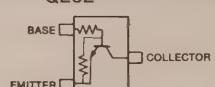
Symbol: 96

DTC124EU
Q247



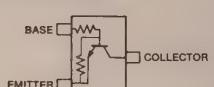
Symbol: 25

DTC144EU
Q243, Q251,
Q252



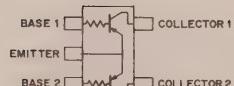
Symbol: 26

DTC144TU
Q233, Q242



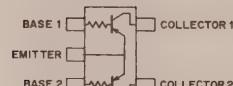
Symbol: 06

FMA3
Q231



Symbol: A3

FM4
Q232



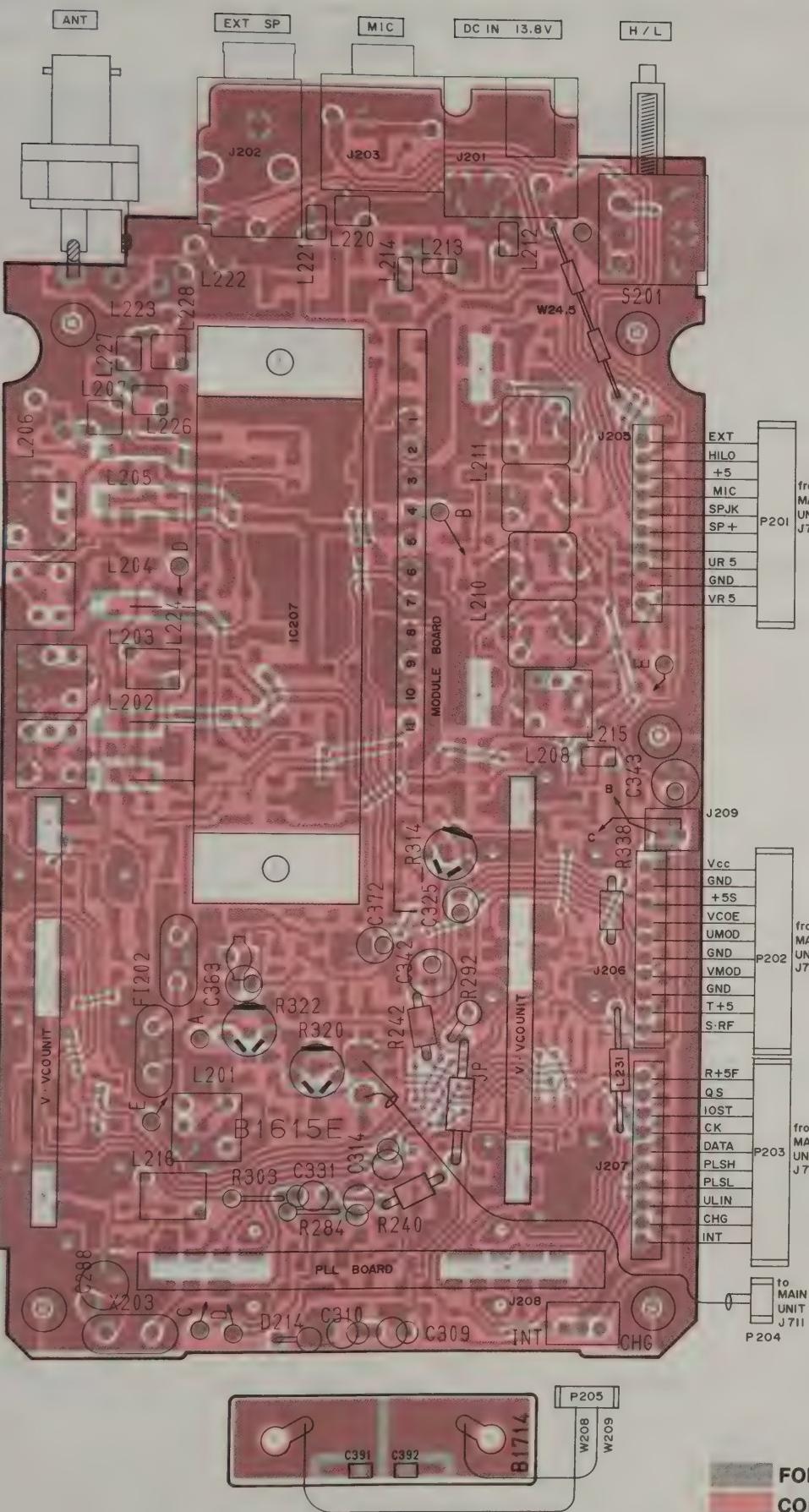
Symbol: A4

FMS1
Q228

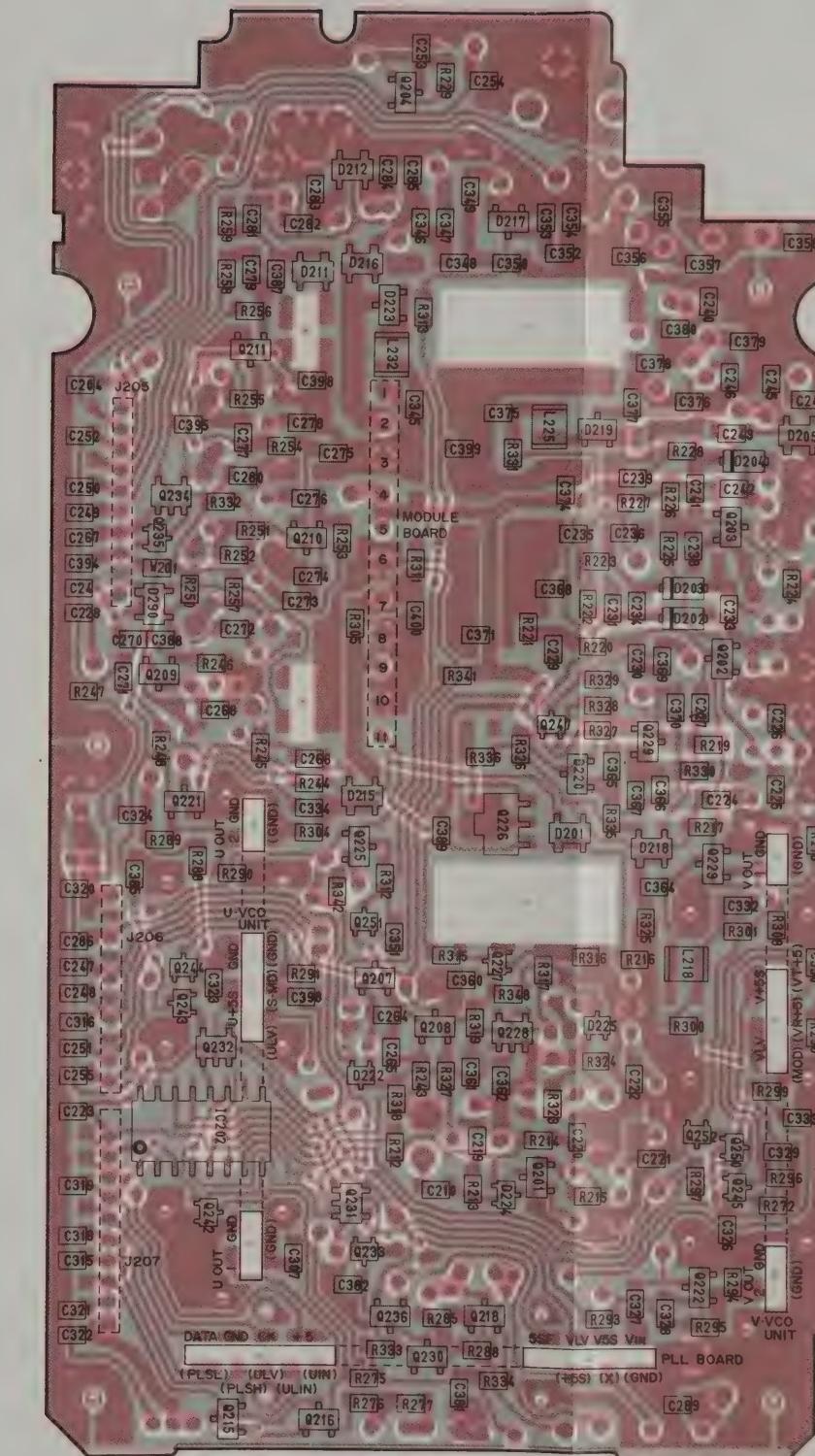


Symbol: SI

COMPONENT SIDE



FOIL SIDE



1SS153
D219, D223

Symbol: A9

1SS154
D217

Symbol: BA

1SV172
D220

Symbol: BE

DA204U
D224

Symbol: K

DAN202U
D222, D225

Symbol: N

MA334 B
D202, D203,
D204

Symbol: 6D82

MA862
D201, D205,
D212, D215,
D216, D218

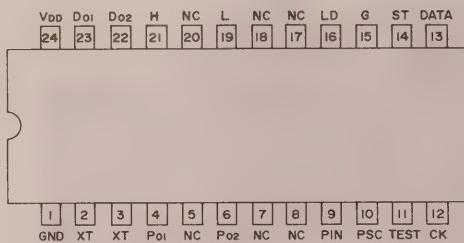
Symbol: M11

FOIL SIDE
COMPONENT SIDE

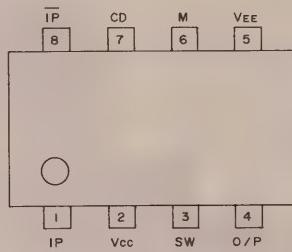
FOIL SIDE
COMPONENT SIDE

7-5 RF UNIT (2)

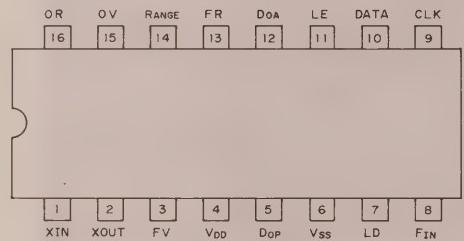
TC9181F IC203
(PLL SYNTHESIZER)



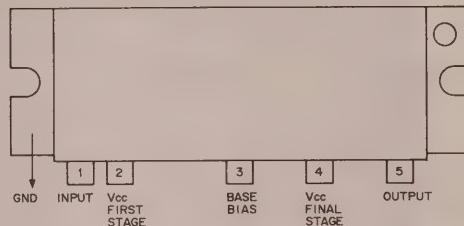
MB504LPF-G-BND IC204
(SWALLOW COUNTER)



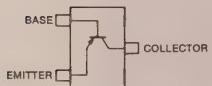
PLL2001S IC205
(PLL SYNTHESIZER)



SC-1081 IC206
(POWER MODULE)

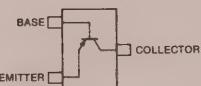


2SA1298 Y
Q248



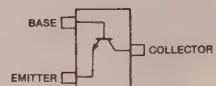
Symbol: IY

2SA1576 S
Q220



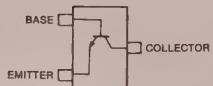
Symbol: FS

2SC2712 BL
Q212



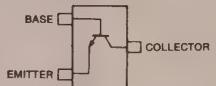
Symbol: LL

2SC3772 3
Q224



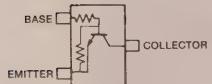
Symbol: LY3

2SC4081 S
Q213, Q217,
Q219



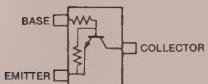
Symbol: BS

RN1402
Q249



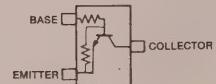
Symbol: XB

RN1403
Q246



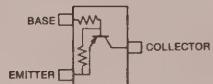
Symbol: XC

RN1404
Q241



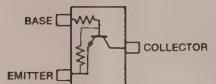
Symbol: XD

UN511E
Q237, Q238



Symbol: 6N

UN521E
Q239



Symbol: 8N

DAN202U
D221



Symbol: N

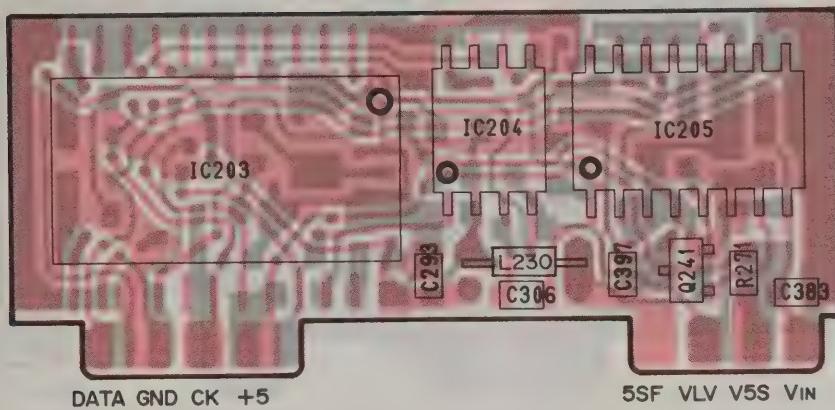
DWA010
D213



Symbol: BM

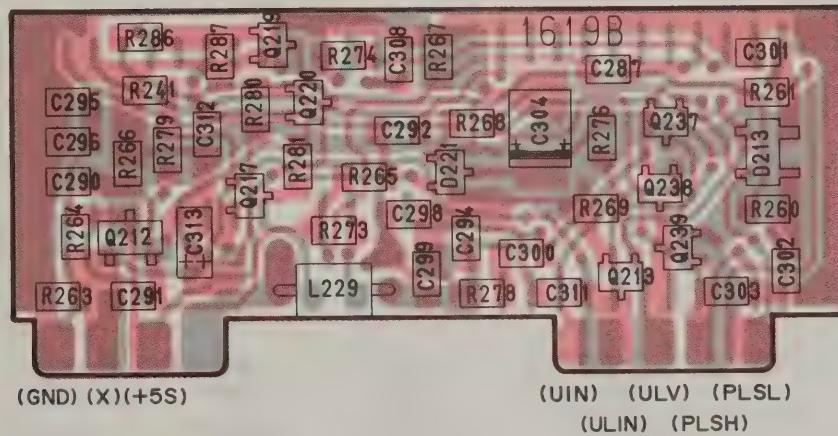
PLL BOARD

COMPONENT SIDE



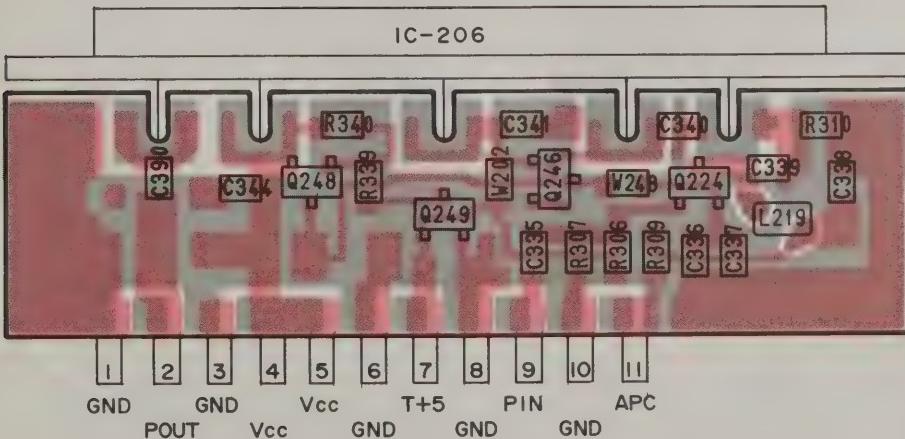
FOIL SIDE
COMPONENT SIDE

FOIL SIDE



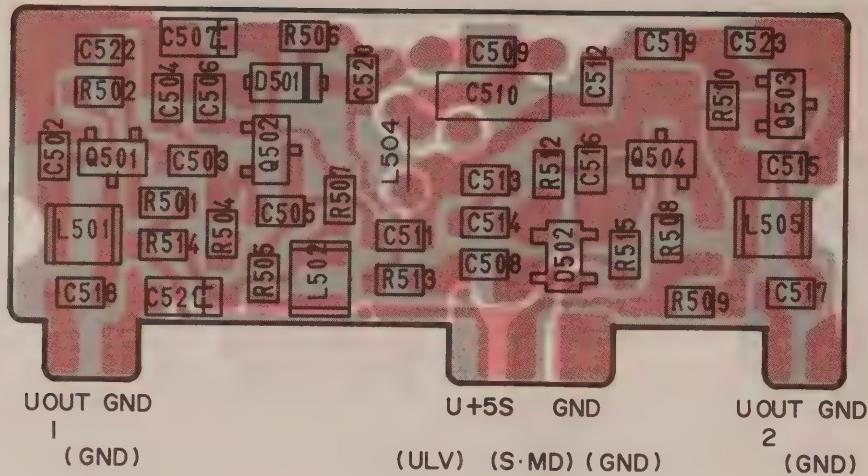
**FOIL SIDE
COMPONENT SIDE**

MODULE BOARD

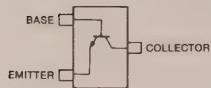


FOIL SIDE
COMPONENT SIDE

7-6 U-VCO UNIT

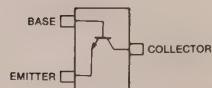


2SC3356 R25
Q502



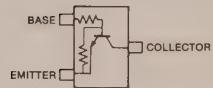
Symbol: R25

2SC3772 3
Q501, Q503



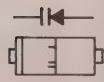
Symbol: LY3

RN1403
Q504



Symbol: XC

MA334 B
D501



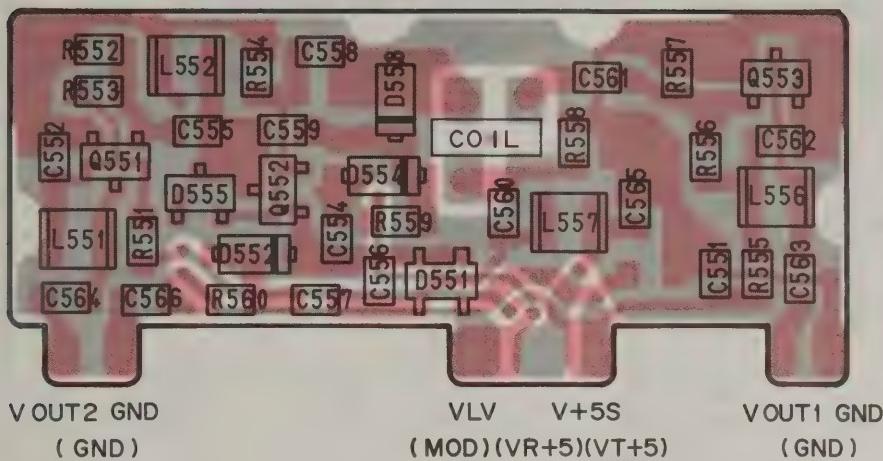
Symbol: 6D82

MA862
D502



Symbol: M11

7-7 V-VCO UNIT



COIL BOARD



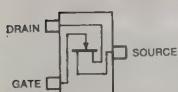
FOIL SIDE
COMPONENT SIDE

2SC3772 3



Symbol: LY3

2SK302 Y
Q552



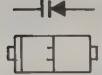
Symbol: TY

1SS154
D555



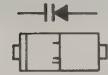
Symbol: BA

MA333
D553



Symbol: 6C83

MA334 B
D552, D554



Symbol: 6D82

MA862
D551

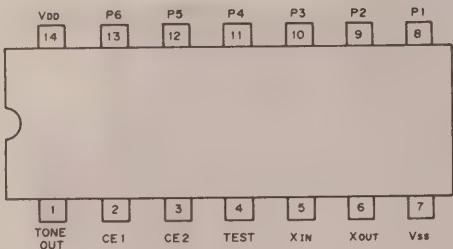


Symbol: M11

7-8 TONE UNIT (IC-32AT)

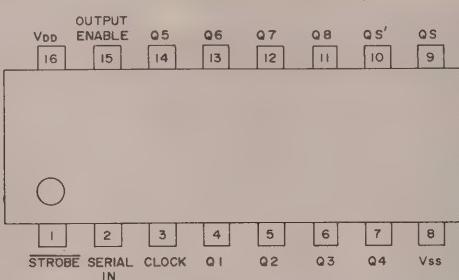
S7116A IC601

(PROGRAMMABLE TONE GENERATOR)

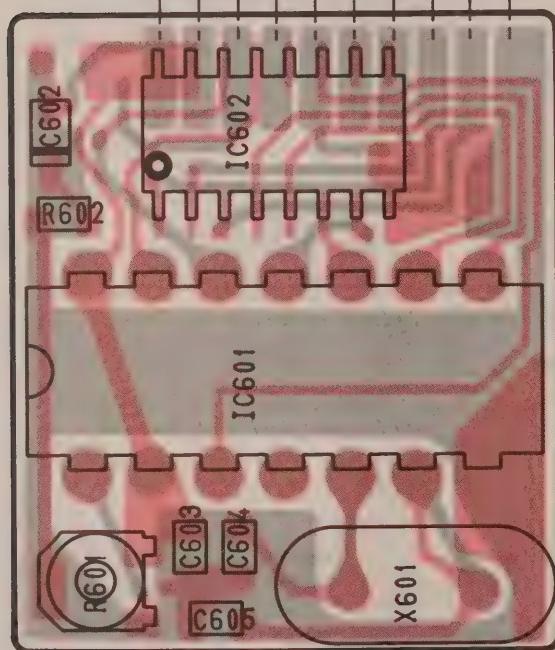
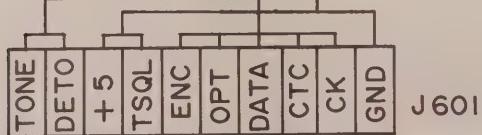


μPD4094BG IC602

(8-STAGE SHIFT AND STORE BUS REGISTER)



from
MAIN UNIT
P704 (J706) P704 (J707)



FOIL SIDE

COMPONENT SIDE

SECTION 8 PARTS LIST

[EF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------------|---------------------------------------|
| D151 | Diode | 1SS133 |
| D152 | Zener | RD20E B2 |
| R151 | Variable Resistor | 10 kΩ A RK097111101NA |
| R152 | Variable Resistor | 10 kΩ B RK09711110051A (IC-32A/AT) |
| R152 | Variable Resistor | 10 kΩ B RK09711114003A (IC-32E) |
| C151 | Ceramic | 47 pF 50 V |
| C152 | Ceramic | 47 pF 50 V |
| C153 | Ceramic | 47 pF 50 V |
| RL151 | Relay | OUC-SH-114D |
| J151 | Connector | TZB-P05H-A1 |
| J152 | Connector | TZB-P05H-A1 |
| P151 | Connector | PI28A10F |
| S151 | Encoder | SRBM1L040A |
| EP151 | P.C. Board | B-1617B |

[LOGIC UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------------|----------------------------------|
| D909 | Diode | 1SS193 (IC-32A/AT: U.S.A., Asia) |
| D910 | Diode | 1SS193 (IC-32A/AT: U.S.A.) |
| D912 | Diode | 1SS254 |
| D913 | Diode | 1SS254 |
| D915 | Diode | 1SS193 (IC-32E: Europe) |
| D915 | Diode | 1SS184 (IC-32E: Italy) |
| D915 | Diode | 1SS196 (IC-32A: Australia) |
| D916 | Diode | 1SS184 (IC-32E) |
| D916 | Diode | 1SS196 (IC-32A/AT) |
| D918 | Diode | 1SS196 |
| X901 | Ceramic Resonator | CSAC3.58MGC300CD (IC-32AT) |
| X902 | Crystal | CR227 (4.1125 MHz) |
| R901 | Resistor | 82 kΩ MCR10 |
| R902 | Resistor | 82 kΩ MCR10 |
| R903 | Resistor | 82 kΩ MCR10 |
| R904 | Resistor | 82 kΩ MCR10 |
| R905 | Resistor | 10 kΩ MCR10 |
| R906 | Resistor | 47 kΩ MCR10 |
| R907 | Resistor | 47 kΩ MCR10 |
| R908 | Resistor | 47 kΩ MCR10 |
| R909 | Resistor | 1 MΩ MCR10 |
| R910 | Resistor | 47 kΩ MCR10 (IC-32AT) |
| R911 | Resistor | 82 kΩ MCR10 (IC-32AT) |
| R912 | Resistor | 82 kΩ MCR10 (IC-32AT) |
| R913 | Resistor | 82 kΩ MCR10 (IC-32AT) |
| R914 | Resistor | 82 kΩ MCR10 (IC-32AT) |
| R915 | Resistor | 1 MΩ MCR10 (IC-32AT) |
| R916 | Resistor | 1 MΩ MCR10 (IC-32AT) |
| R917 | Resistor | 1 MΩ MCR10 (IC-32AT) |
| R918 | Resistor | 1 MΩ MCR10 (IC-32AT) |
| R919 | Resistor | 150 kΩ MCR10 |
| R920 | Resistor | 150 kΩ MCR10 |
| R921 | Resistor | 150 kΩ MCR10 |
| R922 | Resistor | 150 kΩ MCR10 |
| R923 | Resistor | 1 MΩ MCR10 |
| R924 | Resistor | 1 MΩ MCR10 |
| R925 | Resistor | 330 kΩ MCR10 |
| R926 | Resistor | 390 kΩ MCR10 |
| R927 | Resistor | 100 kΩ MCR10 |
| R928 | Resistor | 100 kΩ MCR10 |
| R929 | Resistor | 2.2 kΩ MCR10 |
| R930 | Resistor | 1.5 kΩ MCR10 |
| R931 | Resistor | 220 Ω MCR10 |
| R933 | Resistor | 1.2 MΩ MCR10 |
| R936 | Resistor | 100 kΩ MCR10 |
| R937 | Resistor | 100 kΩ MCR10 |
| R938 | Resistor | 47 kΩ MCR10 |
| R939 | Resistor | 1.2 MΩ MCR10 |
| R940 | Resistor | 1 MΩ MCR10 |
| C901 | Ceramic | 0.001 μF GRM40 (IC-32AT) |
| C902 | Ceramic | 0.1 μF GRM40 F (IC-32AT) |
| C903 | Ceramic | 30 pF GRM40 SL 50PT |
| C904 | Ceramic | 30 pF (IC-32AT) GRM40 SL 50PT |
| C905 | Ceramic | 0.001 μF GRM40 |
| C906 | Ceramic | 15 pF GRM40 |
| C907 | Ceramic | 15 pF GRM40 |
| C908 | Ceramic | 330 pF GRM40 CH |
| C909 | Ceramic | 0.001 μF GRM40 |
| C910 | Ceramic | 47 pF GRM40 |
| C911 | Ceramic | 0.001 μF GRM40 |
| C912 | Ceramic | 0.1 μF GRM40 F |
| C913 | Ceramic | 470 pF 50 V |

[LOGIC UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------------|----------------------|
| C914 | Ceramic | 0.01 μ F GRM40 F |
| C915 | Ceramic | 0.001 μ F GRM40 |
| C916 | Ceramic | 470 pF GRM40 |
| C917 | Ceramic | 470 pF GRM40 |
| C918 | Ceramic | 470 pF GRM40 |
| C919 | Ceramic | 470 pF GRM40 |
| C920 | Ceramic | 470 pF GRM40 |
| C921 | Ceramic | 470 pF GRM40 |
| C922 | Ceramic | 470 pF GRM40 |
| C923 | Ceramic | 470 pF GRM40 |
| C924 | Ceramic | 470 pF GRM40 |
| C925 | Ceramic | 470 pF GRM40 |
| C926 | Ceramic | 470 pF GRM40 |
| C927 | Ceramic | 470 pF GRM40 |
| C928 | Ceramic | 470 pF GRM40 |
| C929 | Ceramic | 470 pF GRM40 |
| C930 | Ceramic | 470 pF GRM40 |
| C931 | Ceramic | 470 pF GRM40 |
| C932 | Ceramic | 470 pF GRM40 |
| C933 | Ceramic | 470 pF GRM40 |
| C934 | Ceramic | 470 pF GRM40 |
| C935 | Ceramic | 470 pF GRM40 |
| C936 | Ceramic | 470 pF GRM40 |
| P901 | Connector | PI28A04F |
| DS901 | LED | SLN-210VC |
| DS902 | Lamp | HRS-3060A-G40 |
| DS903 | Lamp | HRS-3060A-G40 |
| DS904 | LCD | LD-BU9246J |
| MC901 | Microphone | KUC2023-01-006 |
| SP901 | Speaker | Si36D04 |
| EP901 | P.C. Board | B-1712D |
| EP902 | F.P.C Board | B-1622B |
| EP903 | LCD Contact Strip | SRCN-575 |

[MAIN UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|---------------|----------------------------|
| Q714 | Transistor | 2SB909M R |
| Q715 | Transistor | 2SC4081 S |
| Q716 | Transistor | 2SA1162 GR |
| Q717 | Transistor | 2SC4081 S |
| Q718 | Transistor | DTA144EU (IC-32E) |
| Q719 | Transistor | 2SC2712 BL (IC-32AT) |
| Q720 | Transistor | 2SA1576 S |
| Q721 | Transistor | FMW1 |
| Q722 | FET | 2SJ106 GR |
| Q723 | FET | 2SJ106 GR |
| Q724 | Transistor | 2SA1162 GR |
| Q725 | Transistor | DTC144EU |
| D701 | Diode | DAN202U |
| D702 | Diode | DAN202U |
| D703 | Diode | HSM88AS |
| D704 | Diode | 1SS187 |
| D705 | Diode | HSM88AS |
| D706 | Diode | MA862 |
| D707 | Diode | DAN202U |
| D708 | Diode | MA862 |
| D709 | Diode | DAN202U |
| D710 | Diode | DAN202U |
| D711 | Diode | DAN202U |
| D712 | Diode | DAN202U (IC-32E) |
| D713 | Diode | DAP202U (IC-32AT) |
| D714 | Diode | DAN202U |
| D716 | Diode | DAN202U |
| FI701 | Ceramic | CFUM455E |
| X701 | Crystal | CR214 (30.42 MHz) |
| X702 | Discriminator | CDB455C7A |
| X703 | Crystal | CR251 (7.168 MHz) (IC-32E) |
| R701 | Resistor | 820 Ω |
| R702 | Resistor | 680 Ω |
| R703 | Resistor | 4.7 k Ω |
| R704 | Resistor | 1 M Ω |
| R705 | Resistor | 100 k Ω |
| R706 | Resistor | 1 k Ω |
| R707 | Resistor | 4.7 k Ω |
| R708 | Resistor | 39 k Ω |
| R709 | Resistor | 39 k Ω |
| R710 | Resistor | 4.7 k Ω |
| R711 | Resistor | 150 k Ω |
| R712 | Resistor | 2.2 k Ω |
| R713 | Resistor | 15 k Ω |
| R714 | Resistor | 27 k Ω |
| R715 | Resistor | 330 k Ω |
| R717 | Resistor | 47 k Ω |
| R718 | Resistor | 560 Ω |
| R719 | Resistor | 3.3 k Ω |
| R720 | Resistor | 680 Ω |
| R721 | Resistor | 1 M Ω |
| R722 | Resistor | 100 k Ω |
| R723 | Resistor | 22 k Ω |
| R724 | Resistor | 6.8 k Ω |
| R725 | Resistor | 2.2 k Ω |
| R726 | Resistor | 470 Ω |
| R727 | Resistor | 330 k Ω |
| R728 | Resistor | 100 k Ω |
| R729 | Resistor | 5.6 k Ω |
| R730 | Resistor | 1.5 k Ω |
| R731 | Resistor | 47 k Ω |
| R732 | Resistor | 1.5 k Ω |
| R733 | Resistor | 680 k Ω |
| R734 | Resistor | 10 k Ω |
| R735 | Resistor | 100 k Ω |
| R736 | Resistor | 47 k Ω |
| R738 | Trimmer | 22 k Ω B |
| | | RH04A3AJ4J01A |

[MAIN UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|--------------------|
| IC701 | IC | μ PD4094BG |
| IC702 | IC | BA526 |
| IC703 | IC | μ PD4069UBG |
| IC704 | IC | TC5082P-G (IC-32E) |
| IC705 | IC | S81250HG |
| IC706 | IC | M5218FP |
| IC707 | IC | TK10420M |
| Q701 | Transistor | 2SB909M R |
| Q702 | Transistor | 2SC4081 S |
| Q703 | FET | 2SJ106 GR |
| Q705 | Transistor | 2SC4081 S |
| Q706 | Transistor | 2SC4081 S |
| Q708 | Transistor | 2SC2712 BL |
| Q709 | Transistor | 2SC4081 S |
| Q710 | Transistor | 2SC3770 3 |
| Q711 | Transistor | 2SC3770 3 |
| Q712 | Transistor | 2SB909M R |
| Q713 | Transistor | 2SC4081 S |

[MAIN UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|--------------|---|
| R739 | Trimmer | 22 kΩ B RH04A3AJ4J01A |
| R740 | Resistor | 560 kΩ MCR10 |
| R741 | Resistor | 1.5 kΩ MCR10 |
| R742 | Resistor | 4.7 kΩ MCR10 |
| R743 | Resistor | 1.5 kΩ MCR10 |
| R744 | Resistor | 4.7 kΩ MCR10 |
| R745 | Resistor | 10 kΩ MCR10 |
| R746 | Resistor | 5.6 kΩ MCR10 |
| R747 | Resistor | 22 kΩ MCR10 |
| R748 | Trimmer | 10 kΩ B RH04A3AJ4J02A (IC-32E) |
| R749 | Resistor | 47 kΩ MCR10 (IC-32E) |
| R750 | Resistor | 150 kΩ MCR10 (IC-32AT) |
| R751 | Trimmer | 10 kΩ B RH04A3AJ4J02A (IC-32AT) |
| R752 | Resistor | 33 kΩ MCR10 (IC-32AT) |
| R753 | Resistor | 22 kΩ MCR10 (IC-32AT) |
| R754 | Resistor | 100 kΩ MCR10 (IC-32AT) |
| R755 | Resistor | 4.7 kΩ MCR10 |
| R756 | Resistor | 4.7 kΩ MCR10 |
| R757 | Resistor | 68 kΩ MCR10 |
| R758 | Resistor | 2.2 MΩ MCR10 |
| R759 | Resistor | 100 kΩ MCR10 |
| R760 | Resistor | 100 kΩ MCR10 |
| R761 | Resistor | 2.2 MΩ MCR10 |
| R763 | Resistor | 68 kΩ MCR10 |
| R764 | Resistor | 220 kΩ MCR10 |
| R765 | Resistor | 82 kΩ MCR10 |
| R766 | Resistor | 82 kΩ MCR10 |
| R767 | Resistor | 270 kΩ MCR10 |
| R768 | Resistor | 220 kΩ MCR10 |
| R770 | Resistor | 120 Ω MCR10 (IC-32A/AT/E: except U.S.A.) |
| | Resistor | 270 Ω MCR10 (IC-32A/AT: U.S.A.) |
| R771 | Resistor | 240 kΩ MCR10 |
| R772 | Resistor | 180 kΩ MCR10 |
| R773 | Resistor | 47 kΩ MCR10 |
| R774 | Resistor | 1 kΩ MCR10 |
| R775 | Resistor | 180 kΩ MCR10 |
| R776 | Resistor | 10 kΩ MCR10 |
| R777 | Resistor | 470 Ω MCR10 |
| R779 | Trimmer | 47 kΩ B RH0421CS4J08A |
| R781 | Trimmer | 47 kΩ B RH0421CS4J08A |
| R782 | Resistor | 33 kΩ MCR10 |
| R783 | Resistor | 220 kΩ MCR10 |
| R785 | Resistor | 2.2 kΩ MCR10 |
| R786 | Resistor | 22 kΩ MCR10 |
| R787 | Resistor | 8.2 kΩ MCR10 |
| C701 | Ceramic | 470 pF GRM40 |
| C702 | Ceramic | 470 pF GRM40 |
| C703 | Ceramic | 470 pF GRM40 |
| C704 | Ceramic | 470 pF GRM40 |
| C705 | Ceramic | 0.1 μF GRM40 F |
| C706 | Ceramic | 0.01 μF GRM40 B 25PT |
| C707 | Electrolytic | 100 μF 6.3 V RC2 D=5.0 |
| C708 | Ceramic | 470 pF GRM40 |
| C709 | Electrolytic | 2.2 μF 35 V MS5 D=3.0 |
| C710 | Ceramic | 0.001 μF GRM40 |
| C711 | Electrolytic | 1 μF 50 V MS5 |
| C712 | Electrolytic | 47 μF 16 V RC2 D=5.0 |
| C713 | Ceramic | 0.1 μF GRM40 F |
| C714 | Ceramic | 47 pF GRM40 |
| C716 | Ceramic | 0.001 μF GRM40 |
| C717 | Electrolytic | 47 μF 16 V RC2 D=5.0 |
| C718 | Ceramic | 470 pF GRM40 |
| C719 | Ceramic | 470 pF GRM40 |
| C720 | Ceramic | 470 pF GRM40 |
| C721 | Ceramic | 0.001 μF GRM40 |
| C722 | Ceramic | 0.1 μF GRM40 F |
| C723 | Ceramic | 0.1 μF GRM40 F |
| C724 | Ceramic | 0.001 μF GRM40 |
| C725 | Ceramic | 0.0022 μF GRM40 |

[MAIN UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|--------------|---|
| C726 | Ceramic | 0.01 μF GRM40 B 25PT |
| C727 | Ceramic | 0.01 μF GRM40 B 25PT |
| C729 | Ceramic | 0.1 μF GRM40 F |
| C730 | Ceramic | 0.001 μF GRM40 |
| C731 | Ceramic | 0.01 μF GRM40 B 25PT |
| C732 | Tantalum | 0.047 μF 35 V SV |
| C733 | Ceramic | 33 pF GRM40 |
| C734 | Ceramic | 0.001 μF GRM40 |
| C735 | Ceramic | 470 pF GRM40 |
| C736 | Electrolytic | 0.22 μF 50 V MS5 |
| C737 | Ceramic | 0.001 μF GRM40 |
| C739 | Ceramic | 0.001 μF GRM40 |
| C740 | Ceramic | 82 pF GRM40 |
| C741 | Ceramic | 0.1 μF GRM40 F |
| C742 | Ceramic | 0.1 μF GRM40 F |
| C743 | Ceramic | 0.001 μF GRM40 |
| C744 | Ceramic | 18 pF GRM40 |
| C745 | Ceramic | 56 pF GRM40 |
| C746 | Ceramic | 470 pF GRM40 |
| C747 | Ceramic | 470 pF GRM40 |
| C748 | Ceramic | 0.001 μF GRM40 |
| C749 | Tantalum | 2.2 μF 16 V DN |
| C750 | Ceramic | 0.1 μF GRM40 F |
| C751 | Ceramic | 100 pF GRM40 |
| C752 | Ceramic | 0.1 μF GRM40 F |
| C753 | Ceramic | 470 pF GRM40 |
| C754 | Ceramic | 100 pF GRM40 |
| C756 | Ceramic | 470 pF GRM40 |
| C757 | Ceramic | 0.1 μF GRM40 F |
| C758 | Ceramic | 0.1 μF GRM40 F |
| C759 | Ceramic | 470 pF GRM40 |
| C760 | Ceramic | 470 pF GRM40 |
| C761 | Ceramic | 470 pF GRM40 |
| C762 | Ceramic | 470 pF GRM40 |
| C763 | Ceramic | 0.1 μF GRM40 F |
| C764 | Electrolytic | 2.2 μF 35 V MS5 D=3.0 |
| C765 | Ceramic | 0.1 μF GRM40 F |
| C766 | Electrolytic | 4.7 μF 16 V MS5 |
| C767 | Ceramic | 0.1 μF GRM40 F |
| C768 | Ceramic | 47 pF GRM40 (IC-32E) |
| C769 | Ceramic | 10 pF GRM40 (IC-32E) |
| C770 | Ceramic | 10 pF GRM40 (IC-32E) |
| C771 | Ceramic | 0.001 μF GRM40 (IC-32E) |
| C772 | Electrolytic | 0.1 μF 50 V MS5 (IC-32E) |
| C773 | Electrolytic | 4.7 μF 16 V MS5 (IC-32AT) |
| C774 | Ceramic | 0.1 μF GRM40 F (IC-32AT) |
| C775 | Ceramic | 470 pF GRM40 |
| C776 | Ceramic | 470 pF GRM40 |
| C777 | Ceramic | 470 pF GRM40 |
| C778 | Ceramic | 470 pF GRM40 |
| C779 | Ceramic | 0.001 μF GRM40 |
| C780 | Electrolytic | 47 μF 6.3 V RC2 D=4.0 |
| C781 | Ceramic | 0.001 μF GRM40 |
| C782 | Electrolytic | 47 μF 6.3 V RC2 D=4.0 |
| C783 | Ceramic | 470 pF GRM40 |
| C784 | Ceramic | 470 pF GRM40 |
| C785 | Electrolytic | 47 μF 6.3 V RC2 D=4.0 |
| C786 | Ceramic | 0.001 μF GRM40 |
| C787 | Electrolytic | 47 μF 6.3 V RC2 D=4.0 |
| C788 | Ceramic | 470 pF GRM40 |
| C789 | Ceramic | 470 pF GRM40 |
| C790 | Electrolytic | 22 μF 16 V RC2 D=4.0 |
| C791 | Ceramic | 0.001 μF GRM40 |
| C792 | Electrolytic | 47 μF 16 V RC2 D=5.0 |
| C793 | Ceramic | 100 pF GRM40 |
| C794 | Electrolytic | 0.47 μF 50 V MS5 |
| C795 | Electrolytic | 0.47 μF 50 V MS5 |
| C796 | Tantalum | 1 μF 16 V SV |
| C797 | Ceramic | 0.001 μF GRM40 SL 50PT |
| C798 | Ceramic | 0.0022 μF GRM42-6 SL 50PT |
| C799 | Electrolytic | 4.7 μF 16 V MS5 |
| C800 | Ceramic | 120 pF GRM40 |
| C801 | Ceramic | 0.1 μF GRM40 F |
| C802 | Tantalum | 0.22 μF TESVA1V224K1-8L (IC-32A/AT/E: except U.S.A.) |

[MAIN UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-----------------|---|
| C802 | Tantalum | 0.1 μ F TESVA1V104K1-8L (IC-32/AT: U.S.A.) |
| C803 | Ceramic | 470 pF GRM40 |
| C804 | Ceramic | 470 pF GRM40 |
| C805 | Electrolytic | 10 μ F 10 V MS5 D=3.0 |
| C806 | Ceramic | 0.0047 μ F GRM40 |
| C807 | Ceramic | 0.001 μ F GRM40 B 25PT |
| C808 | Ceramic | 0.001 μ F GRM40 |
| C809 | Electrolytic | 10 μ F 10 V MS5 D=3.0 |
| C810 | Ceramic | 0.1 μ F GRM40 F |
| C811 | Electrolytic | 2.2 μ F 35 V MS5 D=3.0 |
| C812 | Ceramic | 47 pF GRM40 |
| C813 | Ceramic | 0.001 μ F GRM40 |
| J701 | Connector | PI28A10M |
| J702 | Connector | PI28A10M |
| J703 | Connector | PI28A10M |
| J704 | Connector | PI28A05M |
| J705 | Connector | PI28A04M |
| J706 | Connector | TZB-P07H-A1 |
| J707 | Connector | TZB-P03H-A1 |
| J708 | Connector | PI28A10M |
| J709 | Connector | CFP4128-0121 |
| J710 | Connector | TZB-P05H-A1 |
| J711 | Connector | PI28A03M |
| P704 | Connector | PI28A10F |
| P706 | Connector | PI28A05F |
| S701 | Switch | SKHMPD004A |
| S702 | Switch | SKHMPD004A |
| S703 | Switch | SKHMPD004A |
| BT701 | Lithium Battery | BR2325-1HC |
| W749 | Jumper | MCR10-JPW |
| W750 | Jumper | MCR10-JPW |
| EP701 | P.C. Board | B-1614D (MAIN) |
| EP702 | P.C. Board | B-1618B (PTT) |
| EP703 | Ferrite Bead | DL2-OP2.6-3-1.2H |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|------------------|
| Q211 | Transistor | 2SC3772 3 |
| Q212 | Transistor | 2SC2712 BL |
| Q213 | Transistor | 2SC4081 S |
| Q215 | FET | 2SK536 |
| Q216 | FET | 2SK536 |
| Q217 | Transistor | 2SC4081 S |
| Q218 | FET | 2SK209 Y |
| Q219 | Transistor | 2SC4081 S |
| Q220 | Transistor | 2SA1576 S |
| Q221 | Transistor | 2SC3772 3 |
| Q222 | Transistor | 2SC3772 3 |
| Q223 | Transistor | 2SC3772 3 |
| Q224 | Transistor | 2SC3772 3 |
| Q225 | FET | 2SJ106 GR |
| Q226 | Transistor | 2SB798 DK |
| Q227 | Transistor | 2SC4081 S |
| Q228 | Transistor | FMS1 |
| Q229 | Transistor | 2SC3772 3 |
| Q230 | FET | 2SK536 |
| Q231 | Transistor | FMA3 |
| Q232 | Transistor | FMA4 |
| Q233 | Transistor | DTC144TU |
| Q236 | FET | 2SK536 |
| Q237 | Transistor | UN511E |
| Q238 | Transistor | UN511E |
| Q239 | Transistor | UN521E |
| Q241 | Transistor | RN1404 |
| Q242 | Transistor | DTC144TU |
| Q243 | Transistor | DTC144EU |
| Q244 | Transistor | DTA144EU |
| Q245 | Transistor | DTA144TU |
| Q246 | Transistor | RN1403 |
| Q247 | Transistor | DTC124EU |
| Q248 | Transistor | 2SA1298 Y |
| Q249 | Transistor | RN1402 |
| Q250 | Transistor | DTA144EU |
| Q251 | Transistor | DTC144EU |
| Q252 | Transistor | DTC144EU |
| D201 | Diode | MA862 |
| D202 | Varicap | MA334 B |
| D203 | Varicap | MA334 B |
| D204 | Varicap | MA334 B |
| D205 | Diode | MA862 |
| D212 | Diode | MA862 |
| D213 | Diode | DWA010 |
| D214 | Zener | RD6.8 E B2 |
| D215 | Diode | MA862 |
| D216 | Diode | MA862 |
| D217 | Diode | 1SS154 |
| D218 | Diode | MA862 |
| D219 | Diode | 1SS153 |
| D220 | Diode | 1SV172 |
| D221 | Diode | DAN202U |
| D222 | Diode | DAN202U |
| D223 | Diode | 1SS153 |
| D224 | Diode | DA204U |
| D225 | Diode | DAN202U |
| FI202 | Monolithic | 30M15B |
| X203 | Crystal | CR247 (10.0 MHz) |
| L201 | Coil | LS-320 |
| L202 | Coil | LS-319 |
| L203 | Coil | LS-321 |
| L204 | Coil | LS-321 |
| L205 | Coil | LS-321 |
| L206 | Coil | LA-228 |
| L207 | Coil | LA-227 |
| L208 | Coil | LS-319 |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|--------------|
| L210 | Coil | LS-338 |
| L211 | Coil | LS-337 |
| L212 | Coil | LA-224 |
| L213 | Coil | LA-223 |
| L214 | Coil | LA-223 |
| L215 | Coil | LA-224 |
| L216 | Coil | LA-247 |
| L218 | Coil | LQN2A R15K |
| L219 | Coil | LA-224 |
| L220 | Coil | LA-224 |
| L221 | Coil | LA-225 |
| L222 | Coil | LA-223 |
| L223 | Coil | LA-232 |
| L224 | Coil | LA-236 |
| L225 | Coil | LQH3N 1R5M |
| L226 | Coil | LA-226 |
| L227 | Coil | LA-225 |
| L228 | Coil | LA-227 |
| L229 | Coil | LAL02TA 100K |
| L230 | Coil | LAL02TA 100K |
| L231 | Coil | LAL02TA 1R5M |
| L232 | Coil | LQN2A 56NM |
| R212 | Resistor | 1.5 kΩ |
| R213 | Resistor | 1 kΩ |
| R214 | Resistor | 39 kΩ |
| R215 | Resistor | 10 kΩ |
| R216 | Resistor | 22 kΩ |
| R217 | Resistor | 10 kΩ |
| R218 | Resistor | 470 Ω |
| R219 | Resistor | 4.7 kΩ |
| R220 | Resistor | 56 Ω |
| R221 | Resistor | 2.2 kΩ |
| R222 | Resistor | 100 kΩ |
| R223 | Resistor | 100 kΩ |
| R224 | Resistor | 22 Ω |
| R225 | Resistor | 330 Ω |
| R226 | Resistor | 15 kΩ |
| R227 | Resistor | 5.6 kΩ |
| R228 | Resistor | 100 kΩ |
| R229 | Resistor | 33 Ω |
| R240 | Resistor | 100 Ω |
| R241 | Resistor | 47 kΩ |
| R242 | Resistor | 6.8 kΩ |
| R243 | Resistor | 6.8 kΩ |
| R244 | Resistor | 10 kΩ |
| R245 | Resistor | 1 kΩ |
| R246 | Resistor | 150 kΩ |
| R247 | Resistor | 68 kΩ |
| R248 | Resistor | 22 Ω |
| R251 | Resistor | 22 Ω |
| R252 | Resistor | 470 Ω |
| R253 | Resistor | 39 kΩ |
| R254 | Resistor | 47 Ω |
| R255 | Resistor | 22 Ω |
| R256 | Resistor | 39 kΩ |
| R257 | Resistor | 47 kΩ |
| R260 | Resistor | 15 kΩ |
| R261 | Resistor | 15 kΩ |
| R263 | Resistor | 100 kΩ |
| R264 | Resistor | 100 kΩ |
| R265 | Resistor | 1 kΩ |
| R266 | Resistor | 2.2 kΩ |
| R267 | Resistor | 10 kΩ |
| R268 | Resistor | 330 kΩ |
| R269 | Resistor | 680 kΩ |
| R270 | Resistor | 680 kΩ |
| R271 | Resistor | 330 kΩ |
| R272 | Resistor | 100 kΩ |
| R273 | Resistor | 1 kΩ |
| R274 | Resistor | 2.2 kΩ |
| R275 | Resistor | 1.2 MΩ |
| R276 | Resistor | 1 kΩ |
| R277 | Resistor | 1.5 kΩ |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|--------------------------|
| R278 | Resistor | 100 Ω |
| R279 | Resistor | 47 kΩ |
| R280 | Resistor | 10 kΩ |
| R281 | Resistor | 47 kΩ |
| R283 | Resistor | 4.7 kΩ |
| R284 | Resistor | 1.8 kΩ |
| R285 | Resistor | 100 kΩ |
| R286 | Resistor | 47 kΩ |
| R287 | Resistor | 10 kΩ |
| R288 | Resistor | 220 Ω |
| R289 | Resistor | 22 kΩ |
| R290 | Resistor | 5.6 kΩ |
| R291 | Resistor | 150 kΩ |
| R292 | Resistor | 8.2 kΩ |
| R293 | Resistor | 470 Ω |
| R294 | Resistor | 15 kΩ |
| R295 | Resistor | 47 kΩ |
| R296 | Resistor | 100 kΩ |
| R297 | Resistor | 47 kΩ |
| R298 | Resistor | 47 kΩ |
| R299 | Resistor | 100 kΩ |
| R300 | Resistor | 100 Ω |
| R301 | Resistor | 22 kΩ |
| R302 | Resistor | 5.6 kΩ |
| R303 | Resistor | 8.2 kΩ |
| R304 | Resistor | 10 kΩ |
| R305 | Resistor | 56 Ω |
| R306 | Resistor | 18 kΩ |
| R307 | Resistor | 6.8 kΩ |
| R309 | Resistor | 330 Ω |
| R310 | Resistor | 220 Ω |
| R311 | Resistor | 100 Ω |
| R312 | Resistor | 1 MΩ |
| R313 | Resistor | 4.7 kΩ |
| R314 | Trimmer | 100 kΩ B EVM-LGG A00 B15 |
| R315 | Resistor | 5.6 kΩ |
| R316 | Resistor | 560 kΩ |
| R317 | Resistor | 220 kΩ |
| R318 | Resistor | 22 kΩ |
| R319 | Resistor | 82 kΩ |
| R320 | Trimmer | 30 kΩ B EVM-LGG A00 B34 |
| R321 | Resistor | 33 kΩ |
| R322 | Trimmer | 5 kΩ B EVM-LGG A00 B53 |
| R323 | Resistor | 1.8 kΩ |
| R324 | Resistor | 22 kΩ |
| R325 | Resistor | 10 kΩ |
| R326 | Resistor | 4.7 kΩ |
| R327 | Resistor | 18 kΩ |
| R328 | Resistor | 6.8 kΩ |
| R329 | Resistor | 10 Ω |
| R330 | Resistor | 220 Ω |
| R331 | Resistor | 150 Ω |
| R332 | Resistor | 100 Ω |
| R333 | Resistor | 1.2 MΩ |
| R334 | Resistor | 47 kΩ |
| R336 | Resistor | 330 Ω |
| R337 | Resistor | 220 Ω |
| R338 | Resistor | 1 MΩ |
| R339 | Resistor | 1.8 kΩ |
| R340 | Resistor | 10 kΩ |
| R341 | Resistor | 100 kΩ |
| R342 | Resistor | 100 kΩ |
| R343 | Resistor | 47 kΩ |
| R344 | Thermistor | ERT-D2FHL503S |
| C204 | Ceramic | 0.001 μF |
| C210 | Ceramic | 0.001 μF |
| C219 | Ceramic | 0.1 μF |
| C220 | Ceramic | 0.01 μF |
| C221 | Ceramic | 47 pF |
| C222 | Ceramic | 12 pF |
| C223 | Ceramic | 0.001 μF |
| C224 | Ceramic | 10 pF |
| C225 | Ceramic | 22 pF |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|----------------------|
| C226 | Ceramic | 0.001 μ F GRM40 |
| C227 | Ceramic | 0.001 μ F GRM40 |
| C228 | Ceramic | 0.001 μ F GRM40 |
| C229 | Ceramic | 0.01 μ F GRM40 F |
| C230 | Ceramic | 47 pF GRM40 |
| C231 | Ceramic | 56 pF GRM40 |
| C233 | Ceramic | 1 pF GRM40 |
| C234 | Ceramic | 7 pF GRM40 |
| C235 | Ceramic | 0.001 μ F GRM40 |
| C236 | Ceramic | 56 pF GRM40 |
| C238 | Ceramic | 0.001 μ F GRM40 |
| C239 | Ceramic | 0.001 μ F GRM40 |
| C240 | Ceramic | 22 pF GRM40 |
| C241 | Ceramic | 12 pF GRM40 |
| C242 | Ceramic | 33 pF GRM40 |
| C243 | Ceramic | 18 pF GRM40 |
| C244 | Ceramic | 22 pF GRM40 |
| C245 | Ceramic | 27 pF GRM40 |
| C246 | Ceramic | 22 pF GRM40 |
| C247 | Ceramic | 47 pF GRM40 |
| C248 | Ceramic | 470 pF GRM40 |
| C249 | Ceramic | 470 pF GRM40 |
| C250 | Ceramic | 470 pF GRM40 |
| C251 | Ceramic | 0.001 μ F GRM40 |
| C252 | Ceramic | 0.001 μ F GRM40 |
| C253 | Ceramic | 470 pF GRM40 |
| C254 | Ceramic | 470 pF GRM40 |
| C255 | Ceramic | 0.001 μ F GRM40 |
| C264 | Ceramic | 470 pF GRM40 |
| C265 | Ceramic | 470 pF GRM40 |
| C266 | Ceramic | 10 pF GRM40 |
| C267 | Ceramic | 470 pF GRM40 |
| C268 | Ceramic | 22 pF GRM40 |
| C269 | Ceramic | 470 pF GRM40 |
| C271 | Ceramic | 0.5 pF GRM40 |
| C272 | Ceramic | 470 pF GRM40 |
| C273 | Ceramic | 470 pF GRM40 |
| C274 | Ceramic | 470 pF GRM40 |
| C275 | Ceramic | 470 pF GRM40 |
| C276 | Ceramic | 10 pF GRM40 |
| C277 | Ceramic | 470 pF GRM40 |
| C278 | Ceramic | 470 pF GRM40 |
| C280 | Ceramic | 0.001 μ F GRM40 |
| C281 | Ceramic | 5 pF GRM40 |
| C282 | Ceramic | 5 pF GRM40 |
| C283 | Ceramic | 7 pF GRM40 |
| C284 | Ceramic | 22 pF GRM40 |
| C285 | Ceramic | 8 pF GRM40 |
| C286 | Ceramic | 0.001 μ F GRM40 |
| C287 | Ceramic | 0.001 μ F GRM40 |
| C288 | Trimmer | 15 pF ECR-GA015E30 |
| C289 | Ceramic | 18 pF GRM40 CH |
| C290 | Ceramic | 56 pF GRM40 CH |
| C291 | Ceramic | 120 pF GRM40 CH |
| C292 | Ceramic | 0.001 μ F GRM40 |
| C293 | Ceramic | 470 pF GRM40 |
| C294 | Ceramic | 0.1 μ F GRM40 F |
| C295 | Ceramic | 0.1 μ F GRM40 F |
| C296 | Ceramic | 0.001 μ F GRM40 |
| C298 | Ceramic | 0.001 μ F GRM40 |
| C299 | Ceramic | 0.1 μ F GRM40 F |
| C300 | Ceramic | 470 pF GRM40 |
| C301 | Ceramic | 47 pF GRM40 |
| C302 | Ceramic | 47 pF GRM40 |
| C303 | Ceramic | 47 pF GRM40 |
| C304 | Tantalum | 6.8 μ F 6.3 V SV |
| C306 | Ceramic | 0.001 μ F GRM40 |
| C307 | Ceramic | 47 pF GRM40 |
| C308 | Ceramic | 0.001 μ F GRM40 |
| C309 | Tantalum | 0.1 μ F 35 V DN |
| C310 | Tantalum | 3.3 μ F 16 V DN |
| C311 | Ceramic | 470 pF GRM40 |
| C312 | Ceramic | 0.001 μ F GRM40 |
| C313 | Tantalum | 3.3 μ F 6.3 V SV |
| C314 | Tantalum | 3.3 μ F 16 V DN |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|--------------|---------------------------|
| C315 | Ceramic | 470 pF GRM40 |
| C316 | Ceramic | 0.001 μ F GRM40 |
| C318 | Ceramic | 47 pF GRM40 |
| C319 | Ceramic | 47 pF GRM40 |
| C320 | Ceramic | 0.001 μ F GRM40 |
| C321 | Ceramic | 470 pF GRM40 |
| C322 | Ceramic | 470 pF GRM40 |
| C323 | Ceramic | 470 pF GRM40 |
| C324 | Ceramic | 470 pF GRM40 |
| C325 | Electrolytic | 0.22 μ F 50 V MS5 |
| C326 | Ceramic | 0.001 μ F GRM40 |
| C327 | Ceramic | 33 pF GRM40 |
| C328 | Ceramic | 0.001 μ F GRM40 |
| C329 | Ceramic | 470 pF GRM40 |
| C330 | Ceramic | 470 pF GRM40 |
| C331 | Tantalum | 0.1 μ F 35 V DN |
| C332 | Ceramic | 0.001 μ F GRM40 |
| C333 | Ceramic | 0.001 μ F GRM40 |
| C334 | Ceramic | 4 pF GRM40 |
| C335 | Ceramic | 470 pF GRM40 |
| C336 | Ceramic | 470 pF GRM40 |
| C337 | Ceramic | 470 pF GRM40 |
| C338 | Ceramic | 470 pF GRM40 |
| C339 | Ceramic | 4 pF GRM40 |
| C340 | Ceramic | 470 pF GRM40 |
| C341 | Ceramic | 470 pF GRM40 |
| C342 | Electrolytic | 10 μ F 10 V MS5 D=3.0 |
| C343 | Electrolytic | 22 μ F 16 V RC2 D=4.0 |
| C344 | Ceramic | 470 pF GRM40 |
| C345 | Ceramic | 470 pF GRM40 |
| C346 | Ceramic | 5 pF GRM40 |
| C347 | Ceramic | 56 pF GRM40 |
| C348 | Ceramic | 4 pF GRM40 |
| C349 | Ceramic | 22 pF GRM40 |
| C350 | Ceramic | 5 pF GRM40 |
| C351 | Ceramic | 470 pF GRM40 |
| C352 | Ceramic | 1 pF GRM40 |
| C353 | Ceramic | 5 pF GRM40 |
| C354 | Ceramic | 5 pF GRM40 |
| C355 | Ceramic | 2 pF GRM40 |
| C356 | Ceramic | 10 pF GRM40 |
| C357 | Ceramic | 0.75 pF GRM40 SL 50PT |
| C358 | Ceramic | 7 pF GRM40 |
| C360 | Ceramic | 470 pF GRM40 |
| C361 | Ceramic | 470 pF GRM40 |
| C362 | Ceramic | 470 pF GRM40 |
| C363 | Electrolytic | 10 μ F 10 V MS5 D=3.0 |
| C364 | Ceramic | 10 pF GRM40 |
| C365 | Ceramic | 0.001 μ F GRM40 |
| C366 | Ceramic | 0.001 μ F GRM40 |
| C367 | Ceramic | 0.001 μ F GRM40 |
| C368 | Ceramic | 0.001 μ F GRM40 |
| C369 | Ceramic | 0.001 μ F GRM40 |
| C370 | Ceramic | 15 pF GRM40 |
| C371 | Ceramic | 0.001 μ F GRM40 |
| C372 | Electrolytic | 10 μ F 10 V MS5 D=3.0 |
| C374 | Ceramic | 0.001 μ F GRM40 |
| C375 | Ceramic | 470 pF GRM40 |
| C376 | Ceramic | 8 pF GRM40 |
| C377 | Ceramic | 0.001 μ F GRM40 |
| C378 | Ceramic | 6 pF GRM40 |
| C379 | Ceramic | 15 pF GRM40 |
| C380 | Ceramic | 15 pF GRM40 |
| C381 | Ceramic | 0.1 μ F GRM40 F |
| C382 | Ceramic | 47 pF GRM40 |
| C383 | Ceramic | 7 pF GRM40 |
| C385 | Ceramic | 470 pF GRM40 |
| C387 | Ceramic | 470 pF GRM40 |
| C388 | Ceramic | 0.001 μ F GRM40 |
| C389 | Ceramic | 470 pF GRM40 |
| C390 | Ceramic | 0.001 μ F GRM40 |
| C391 | Ceramic | 470 pF GRM40 |
| C392 | Ceramic | 470 pF GRM40 |
| C393 | Tantalum | 10 μ F 16 V DN |

[RF UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|--------------|---------------------------|
| C394 | Ceramic | 470 pF GRM40 |
| C395 | Ceramic | 470 pF GRM40 |
| C396 | Ceramic | 470 pF GRM40 |
| C397 | Ceramic | 470 pF GRM40 |
| C398 | Ceramic | 100 pF GRM40 |
| C399 | Ceramic | 0.001 μ F GRM40 |
| C400 | Ceramic | 470 pF GRM40 |
| J201 | Connector | HEC0779-01-030 |
| J202 | Connector | HSJ0836-01-010 |
| J203 | Connector | HSJ1102-01-540 |
| J205 | Connector | TZB-P10H-A1 |
| J206 | Connector | TZB-P10H-A1 |
| J207 | Connector | TZB-P10H-A1 |
| J208 | Connector | PI28A03M |
| J209 | Connector | TZB-P02H-A1 |
| J210 | Connector | BNC-R111-E |
| P201 | Connector | PI28A10F |
| P202 | Connector | PI28A10F |
| P203 | Connector | PI28A10F |
| P204 | Connector | PI28A03F |
| P205 | Connector | PI28A03F |
| S201 | Switch | SPPJ62 |
| W201 | Jumper | MCR10-JPW |
| W202 | Jumper | MCR10-JPW |
| W248 | Jumper | MCR10-JPW |
| W249 | Jumper | JPW-02A |
| W250 | Jumper | JPW-02A |
| EP201 | P.C. Board | B-1615E (RF) |
| EP202 | P.C. Board | B-1619B (PLL) |
| EP203 | P.C. Board | B-1668B (MODULE) |
| EP205 | P.C. Board | B-1714 (BATTERY TERMINAL) |
| EP208 | Ferrite Bead | DL2-OP2.6-3-1.2H |
| EP209 | Ferrite Bead | DL2-OP2.6-3-1.2H |
| EP210 | Ferrite Bead | DL2-OP2.6-3-1.2H |
| EP211 | Ferrite Bead | DL2-OP2.6-3-1.2H |

[U-VCO UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|----------------------|
| R501 | Resistor | 330 Ω MCR10 |
| R502 | Resistor | 33 k Ω MCR10 |
| R504 | Resistor | 220 Ω MCR10 |
| R505 | Resistor | 47 Ω MCR10 |
| R506 | Resistor | 4.7 k Ω MCR10 |
| R507 | Resistor | 6.8 k Ω MCR10 |
| R508 | Resistor | 47 k Ω MCR10 |
| R509 | Resistor | 330 Ω MCR10 |
| R510 | Resistor | 33 k Ω MCR10 |
| R512 | Resistor | 4.7 k Ω MCR10 |
| R513 | Resistor | 4.7 k Ω MCR10 |
| R514 | Resistor | 100 Ω MCR10 |
| R515 | Resistor | 2.2 k Ω MCR10 |
| C502 | Ceramic | 470 pF GRM40 |
| C503 | Ceramic | 0.5 pF GRM40 |
| C504 | Ceramic | 6 pF GRM40 CH |
| C505 | Ceramic | 6 pF GRM40 CH |
| C506 | Ceramic | 470 pF GRM40 |
| C507 | Tantalum | 1 μ F 16 V SV |
| C508 | Ceramic | 0.1 μ F GRM40 F |
| C509 | Ceramic | 12 pF GRM40 |
| C510 | Trimmer | 10 pF ECR-LB010A12 |
| C511 | Ceramic | 12 pF GRM40 |
| C512 | Ceramic | 0.3 pF GRM40 SL 50PT |
| C513 | Ceramic | 8 pF GRM40 |
| C514 | Ceramic | 6 pF GRM40 |
| C515 | Ceramic | 470 pF GRM40 |
| C516 | Ceramic | 470 pF GRM40 |
| C517 | Ceramic | 4 pF GRM40 |
| C518 | Ceramic | 4 pF GRM40 |
| C519 | Ceramic | 0.5 pF GRM40 |
| C521 | Tantalum | 1 μ F 16 V SV |
| C522 | Ceramic | 10 pF GRM40 |
| C523 | Ceramic | 10 pF GRM40 |
| EP501 | P.C. Board | B-1718A |

[V-VCO UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|----------------------|
| Q551 | Transistor | 2SC3772 3 |
| Q552 | FET | 2SK302 Y |
| Q553 | Transistor | 2SC3772 3 |
| D551 | Diode | MA862 |
| D552 | Varicap | MA334 B |
| D553 | Varicap | MA333 |
| D554 | Varicap | MA334 B |
| D555 | Diode | 1SS154 |
| L551 | Coil | LQN2A R15K |
| L552 | Coil | LQH3N 1R5M |
| L554 | Coil | LB-230 |
| L556 | Coil | LQN2A R15K |
| L557 | Coil | LQH3N 1R5M |
| R551 | Resistor | 1 k Ω MCR10 |
| R552 | Resistor | 39 k Ω MCR10 |
| R553 | Resistor | 100 k Ω MCR10 |
| R554 | Resistor | 10 k Ω MCR10 |
| R555 | Resistor | 1 k Ω MCR10 |

[U-VCO UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|--|
| Q501 | Transistor | 2SC3772 3 |
| Q502 | Transistor | 2SC3356 R25 |
| Q503 | Transistor | 2SC3772 3 |
| Q504 | Transistor | RN1403 |
| D501 | Varicap | MA334 B |
| D502 | Varicap | MA862 |
| L501 | Coil | LQN2A 47NM |
| L502 | Coil | LQH3N R39M |
| L504 | Coil | LA-225 (IC-32A/AT/E: except U.S.A.) |
| L504 | Coil | LA-224 (IC-32/AT: U.S.A.) |
| L505 | Coil | LQN2A 47NM |

[V-VCO UNIT]

| REF. NO. | DESCRIPTION | PART NO. | |
|----------|-------------|-----------------|---------------|
| R556 | Resistor | 100 kΩ | MCR10 |
| R557 | Resistor | 39 kΩ | MCR10 |
| R558 | Resistor | 4.7 kΩ | MCR10 |
| R559 | Resistor | 1 kΩ | MCR10 |
| R560 | Resistor | 10 kΩ | MCR10 |
| C551 | Ceramic | 0.001 μF | GRM40 |
| C552 | Ceramic | 0.001 μF | GRM40 |
| C554 | Ceramic | 0.001 μF | GRM40 |
| C555 | Ceramic | 0.5 pF | GRM40 |
| C556 | Ceramic | 15 pF | GRM40 |
| C557 | Ceramic | 3 pF | GRM40 |
| C558 | Ceramic | 100 pF | GRM40 |
| C559 | Ceramic | 0.001 μF | GRM40 |
| C560 | Ceramic | 0.001 μF | GRM40 |
| C561 | Ceramic | 0.75 pF | GRM40 SL 50PT |
| C562 | Ceramic | 0.001 μF | GRM40 |
| C563 | Ceramic | 7 pF | GRM40 |
| C564 | Ceramic | 7 pF | GRM40 |
| C565 | Ceramic | 0.001 μF | GRM40 |
| C566 | Ceramic | 470 pF | GRM40 |
| EP551 | P.C. Board | B-1623C (V-VCO) | |
| EP552 | P.C. Board | B-1604 (COIL) | |

[TONE UNIT] (IC-32AT)

| REF. NO. | DESCRIPTION | PART NO. | |
|----------|-------------|-----------------------|---------------|
| IC601 | IC | S7116A | |
| IC602 | IC | μPD4094BG | |
| X601 | Crystal | RF4A3 FAA (3.578 MHz) | |
| R601 | Trimmer | 47 kΩ | RH04A3AS4J01A |
| R602 | Resistor | 47 kΩ | MCR10 |
| C602 | Tantalum | 0.47 μF | 25 V SV |
| C603 | Ceramic | 470 pF | GRM40 |
| C604 | Ceramic | 47 pF | GRM40 |
| C605 | Ceramic | 39 pF | GRM40 |
| J601 | Connector | PI28A10M | |
| EP601 | P.C. Board | B-1566B | |

SECTION 9 OPTIONAL UNITS

9-1 UT-40 TONE SQUELCH UNIT CIRCUIT DESCRIPTION

9-1-1 GENERAL DESCRIPTION

IC1 is a tone encoder/decoder IC chip that outputs and detects 37 different kinds of tones. A tone is set by serial data from IC902 on the LOGIC UNIT in the IC-32A/AT/E.

IC2 functions as a serial/parallel converter, applying 6-bit parallel data to IC1. The following table shows the relation between frequency and input data in IC1.

| OUTPUT FREQUENCY [Hz] | IC1 INPUT PIN NUMBER | | | | | | OUTPUT FREQUENCY [Hz] | IC1 INPUT PIN NUMBER | | | | | | OUTPUT FREQUENCY [Hz] | IC1 INPUT PIN NUMBER | | | | | |
|-----------------------|----------------------|---|---|---|---|---|-----------------------|----------------------|---|---|---|---|---|-----------------------|----------------------|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | | 3 | 4 | 5 | 6 | 7 | 8 | | 3 | 4 | 5 | 6 | 7 | 8 |
| 67.0 | H | L | H | H | H | L | 110.9 | H | L | H | L | H | H | 173.8 | L | L | L | H | L | H |
| 71.9 | L | L | H | H | H | L | 114.8 | L | L | H | L | H | H | 179.9 | H | H | H | L | L | H |
| 74.4 | H | H | L | H | H | L | 118.8 | H | H | L | L | H | H | 186.2 | L | H | H | L | L | H |
| 77.0 | L | H | L | H | H | L | 123.0 | L | H | L | L | H | H | 192.8 | H | L | H | L | L | H |
| 79.7 | H | L | L | H | H | L | 127.3 | H | L | L | L | H | H | 203.5 | L | L | H | L | L | H |
| 82.5 | L | L | L | H | H | L | 131.8 | L | L | L | L | H | H | 210.7 | H | H | L | L | L | H |
| 85.4 | H | H | H | L | H | L | 136.5 | H | H | H | H | L | H | 218.1 | L | H | L | L | L | H |
| 88.5 | L | H | H | L | H | L | 141.3 | L | H | H | H | L | H | 225.7 | H | L | L | L | L | H |
| 91.5 | H | L | H | L | H | L | 146.2 | H | L | H | H | L | H | 233.6 | L | L | L | L | L | H |
| 94.8 | H | L | L | H | H | H | 151.4 | L | L | H | H | L | H | 241.8 | H | H | H | H | H | L |
| 100.0 | L | L | L | H | H | H | 156.7 | H | H | L | H | L | H | 250.3 | L | H | H | H | H | L |
| 103.5 | H | H | H | L | H | H | 162.2 | L | H | L | H | L | H | — | — | — | — | — | — | — |
| 107.2 | L | H | H | L | H | H | 167.9 | H | L | L | H | L | H | — | — | — | — | — | — | — |

H: HIGH L: LOW

9-1-2 ENCODER CIRCUIT

Pin 26 in IC1 outputs a programmed tone frequency when pin 12 in IC1 becomes "LOW."

Q4 functions as a buffer amplifier. The collector of Q4 outputs the tone signal and the signal is applied to the VCO circuit to be modulated.

Tone deviation can be adjusted by R10.

9-1-3 DECODER CIRCUIT

Detected signals from pin 11 in IC707 on the MAIN UNIT of the IC-32A/AT/E are applied to pin 29 in IC1 on the UT-40 through the DETO line. When the signals have a tone modulated and the tone is matched with the programmed tone frequency by IC2, pin 23 in IC1 changes from "LOW" to "HIGH."

• When the tone squelch function is turned OFF:

Both pins 11 and 12 in IC2 are "HIGH" and +5V are not applied to IC1. Q2 and Q3 turn OFF and the TSQ line is "HIGH."

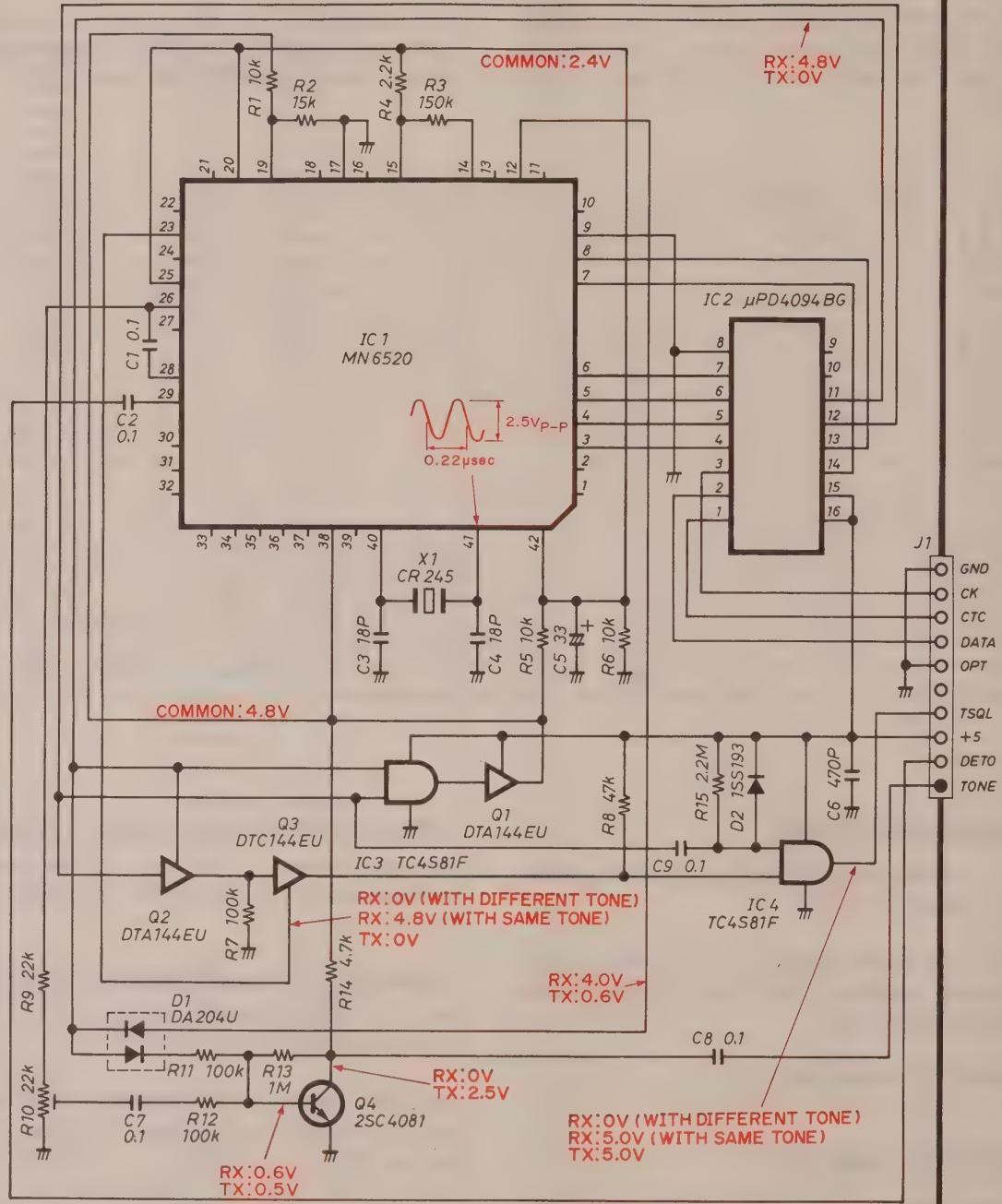
• When the tone squelch function is turned ON:

Pin 11 of IC2 is "HIGH" and pin 12 of IC2 is "LOW." Both Q2 and Q3 turn ON.

When the received tone frequency is not matched with the programmed tone frequency, pin 23 of IC1 is "LOW" and the TSQ line is "LOW."

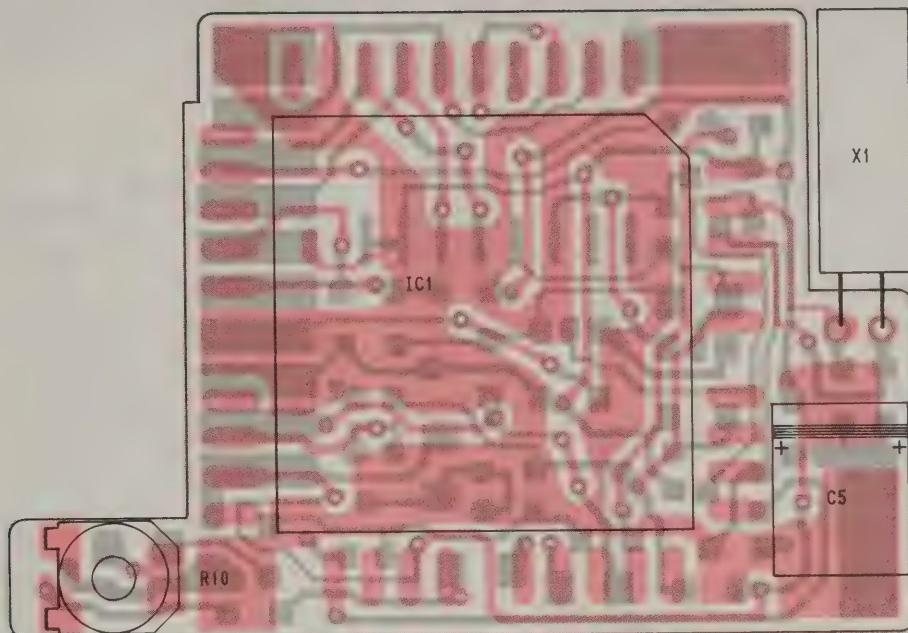
When the received tone frequency is matched with the programmed tone, pin 23 becomes "HIGH" and the TSQ line becomes "HIGH."

9-2 UT-40 VOLTAGE/CIRCUIT DIAGRAM



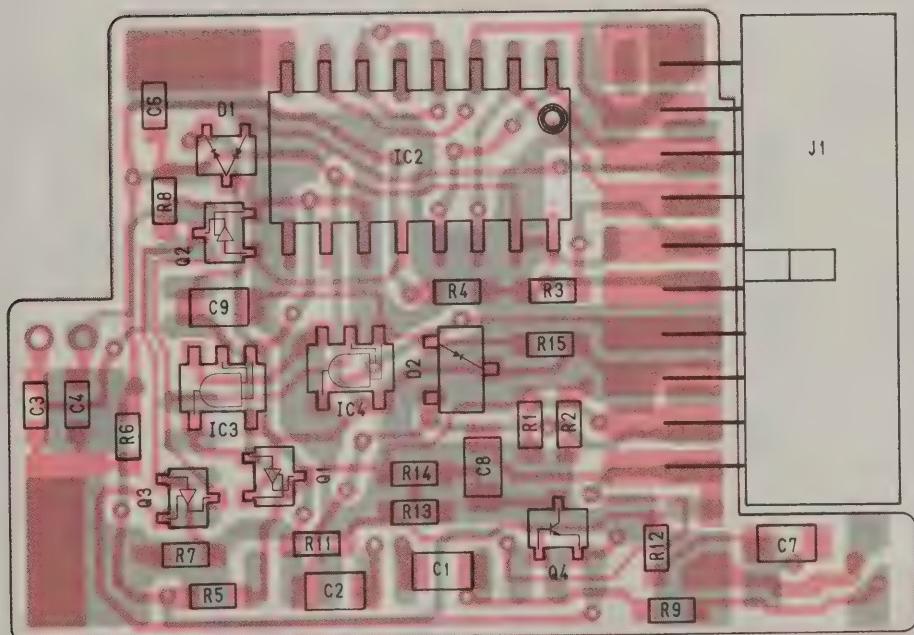
9-3 UT-40 BOARD LAYOUTS

COMPONENT SIDE



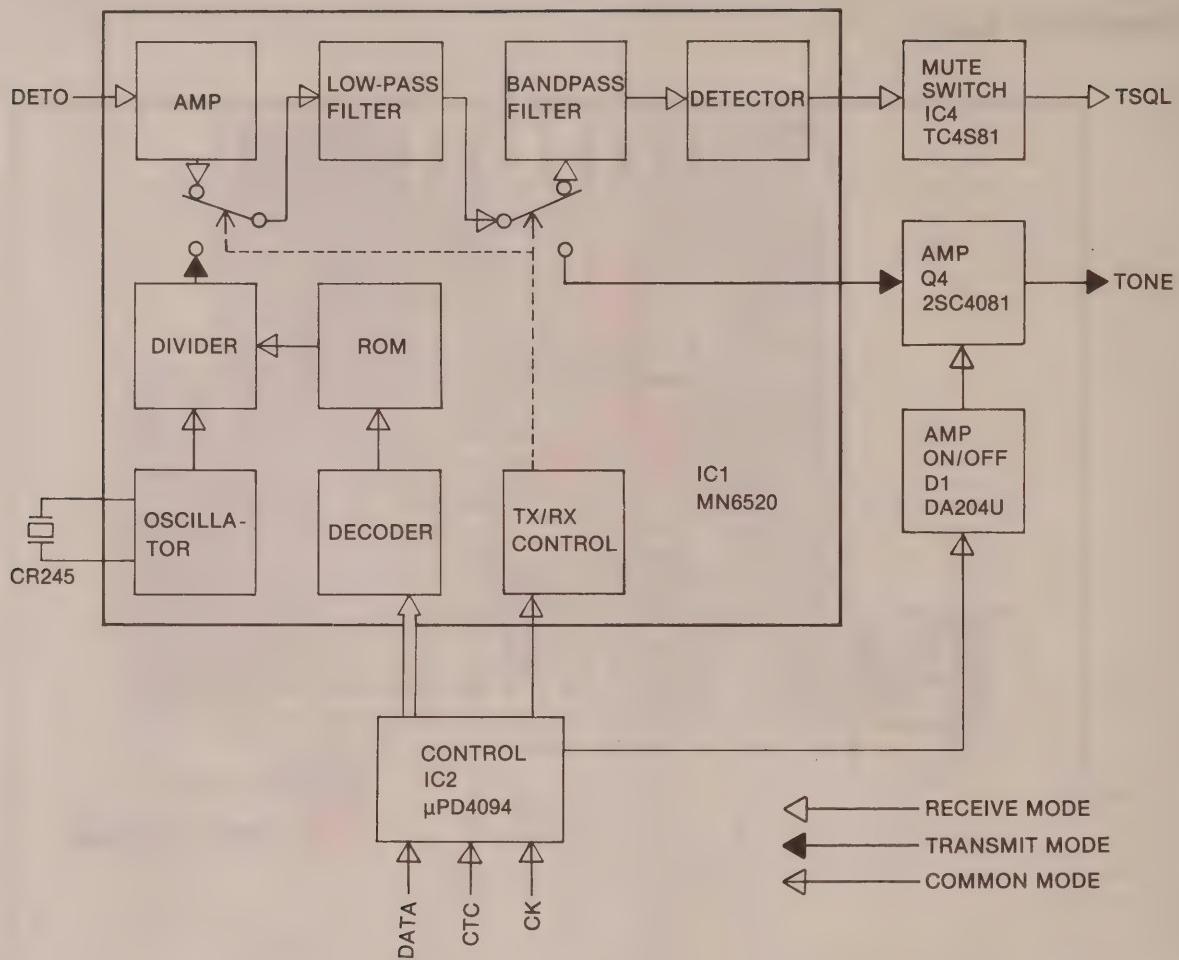
FOIL SIDE
COMPONENT SIDE

FOIL SIDE



FOIL SIDE
COMPONENT SIDE

9-4 UT-40 BLOCK DIAGRAM



9-5 UT-40 PARTS LIST

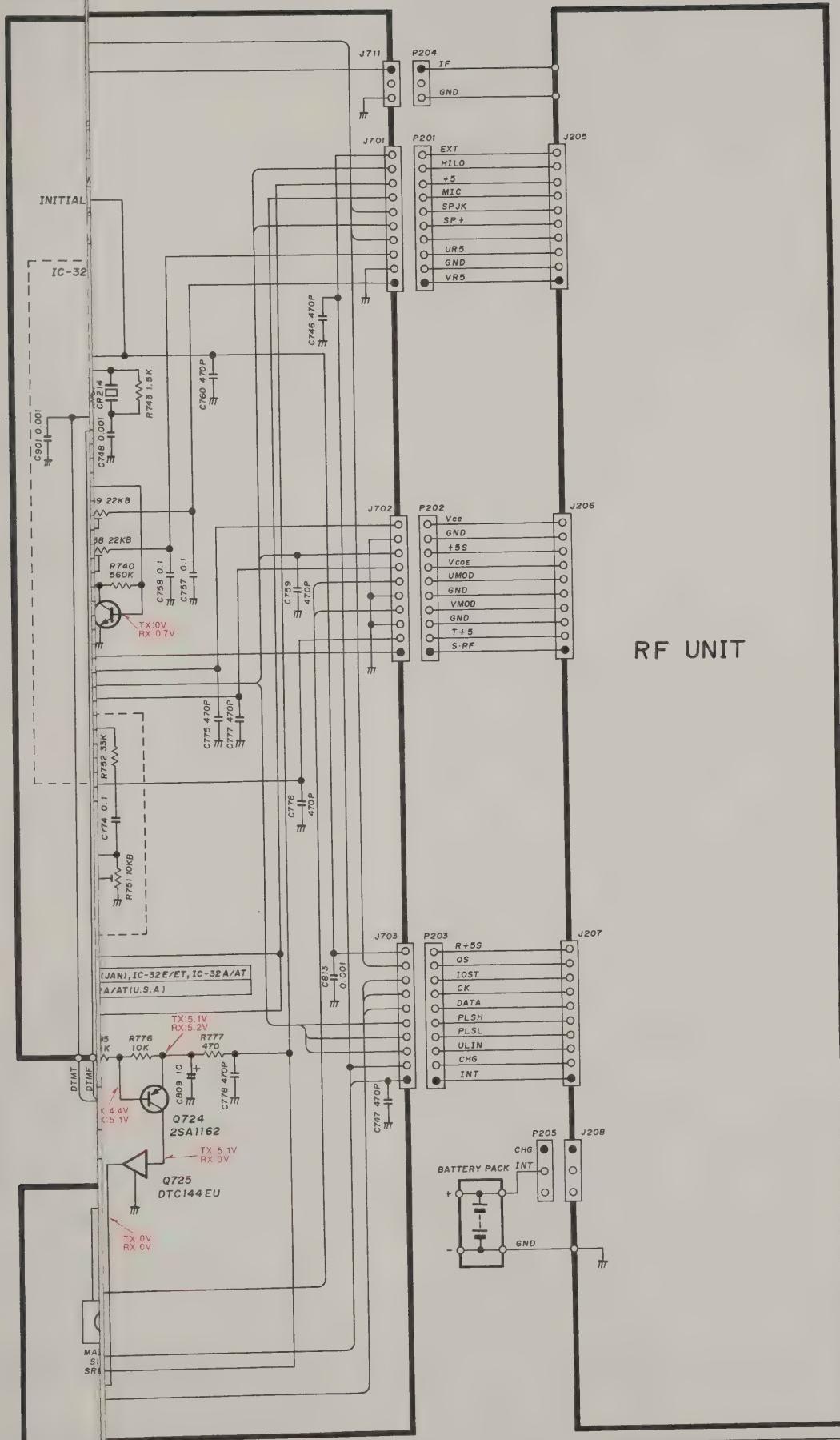
[T. SQL UNIT]

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|-----------|
| IC1 | IC | MN6520 |
| IC2 | IC | μPD4094BG |
| IC3 | IC | TC4S81F |
| IC4 | IC | TC4S81F |
| Q1 | Transistor | DTA144EU |
| Q2 | Transistor | DTA144EU |
| Q3 | Transistor | DTC144EU |
| Q4 | Transistor | 2SC4081 R |
| D1 | Diode | DA204U |
| D2 | Diode | 1SS193 |
| X1 | Crystal | CR245 |
| R1 | Resistor | 10 kΩ |
| R2 | Resistor | 15 kΩ |
| R3 | Resistor | 150 kΩ |
| R4 | Resistor | 2.2 kΩ |
| R5 | Resistor | 10 kΩ |
| R6 | Resistor | 10 kΩ |
| R7 | Resistor | 100 kΩ |
| R8 | Resistor | 47 kΩ |

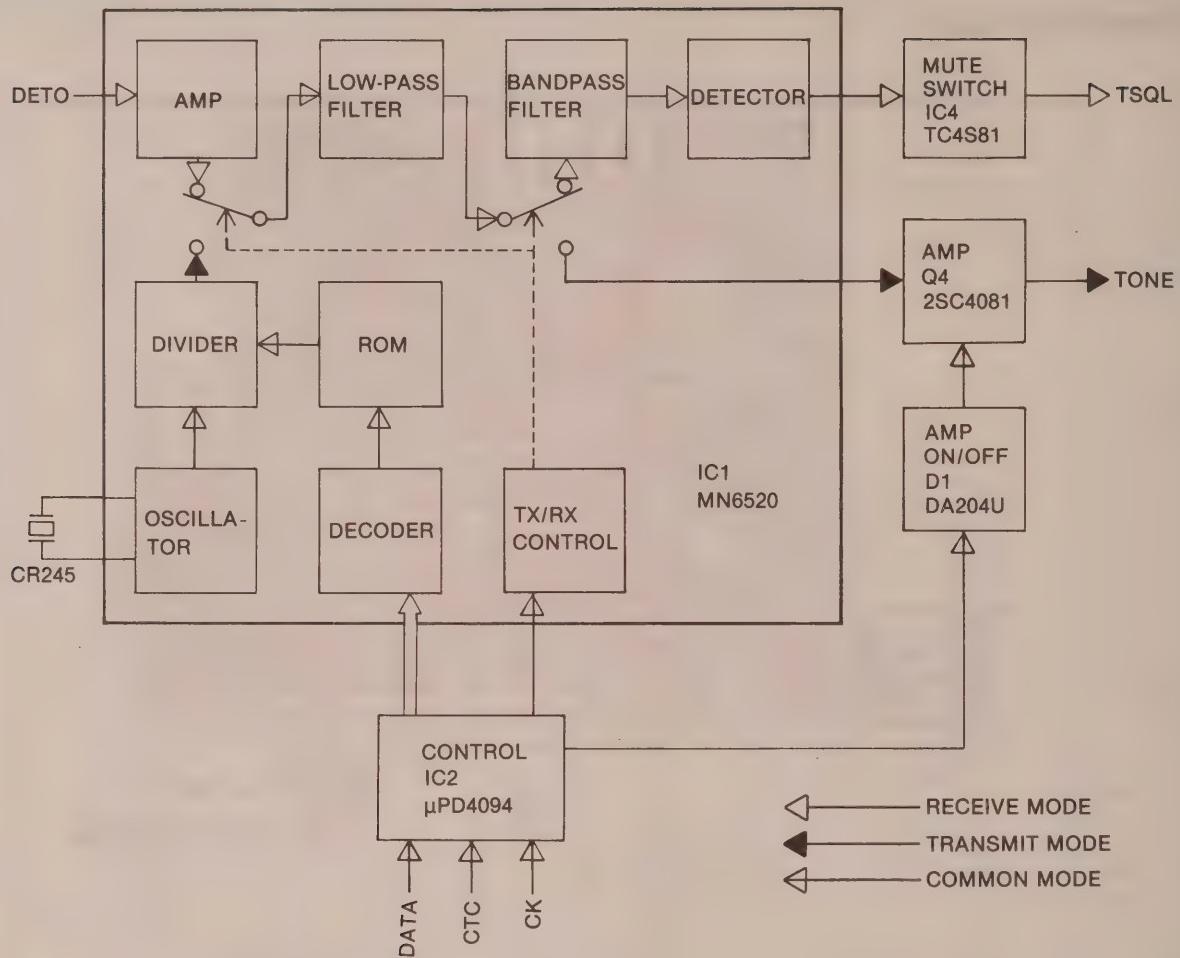
| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|----------|
| R9 | Resistor | 22 kΩ |
| R10 | Trimmer | 22 kΩ |
| R11 | Resistor | 100 kΩ |
| R12 | Resistor | 100 kΩ |
| R13 | Resistor | 1 MΩ |
| R14 | Resistor | 4.7 kΩ |
| R15 | Resistor | 2.2 MΩ |
| C1 | Ceramic | 0.1 μF |
| C2 | Ceramic | 0.1 μF |
| C3 | Ceramic | 50 μF |
| C4 | Ceramic | 50 μF |
| C5 | Tantalum | 33 μF |
| C6 | Ceramic | 50 μF |
| C7 | Ceramic | 0.1 μF |
| C8 | Ceramic | 0.1 μF |
| C9 | Ceramic | 0.1 μF |
| J1 | Connector | PI28A10M |
| EP1 | P.C. Board | B-1577C |

SECTION

LOGIC AND M



9-4 UT-40 BLOCK DIAGRAM



9-5 UT-40 PARTS LIST

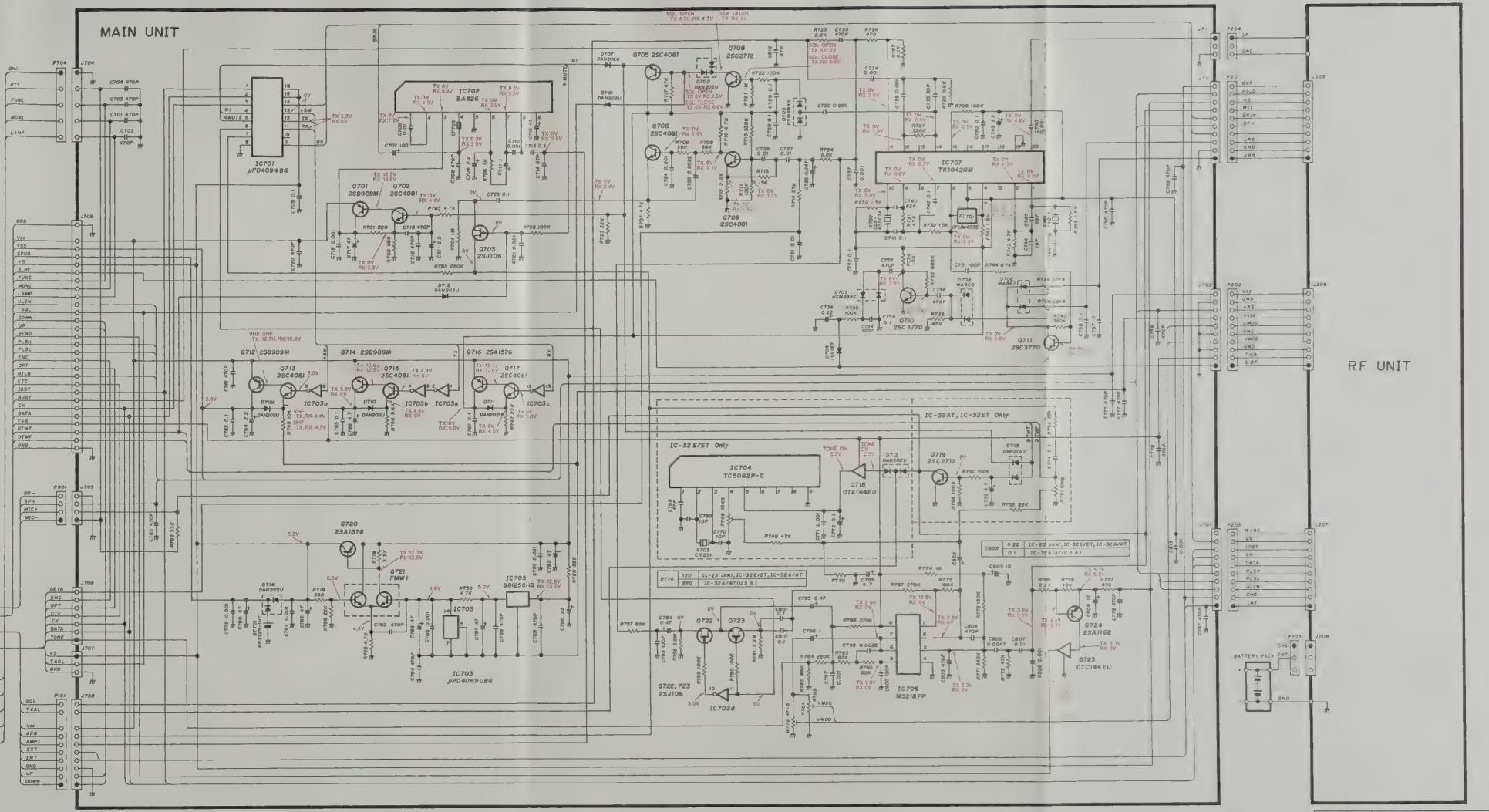
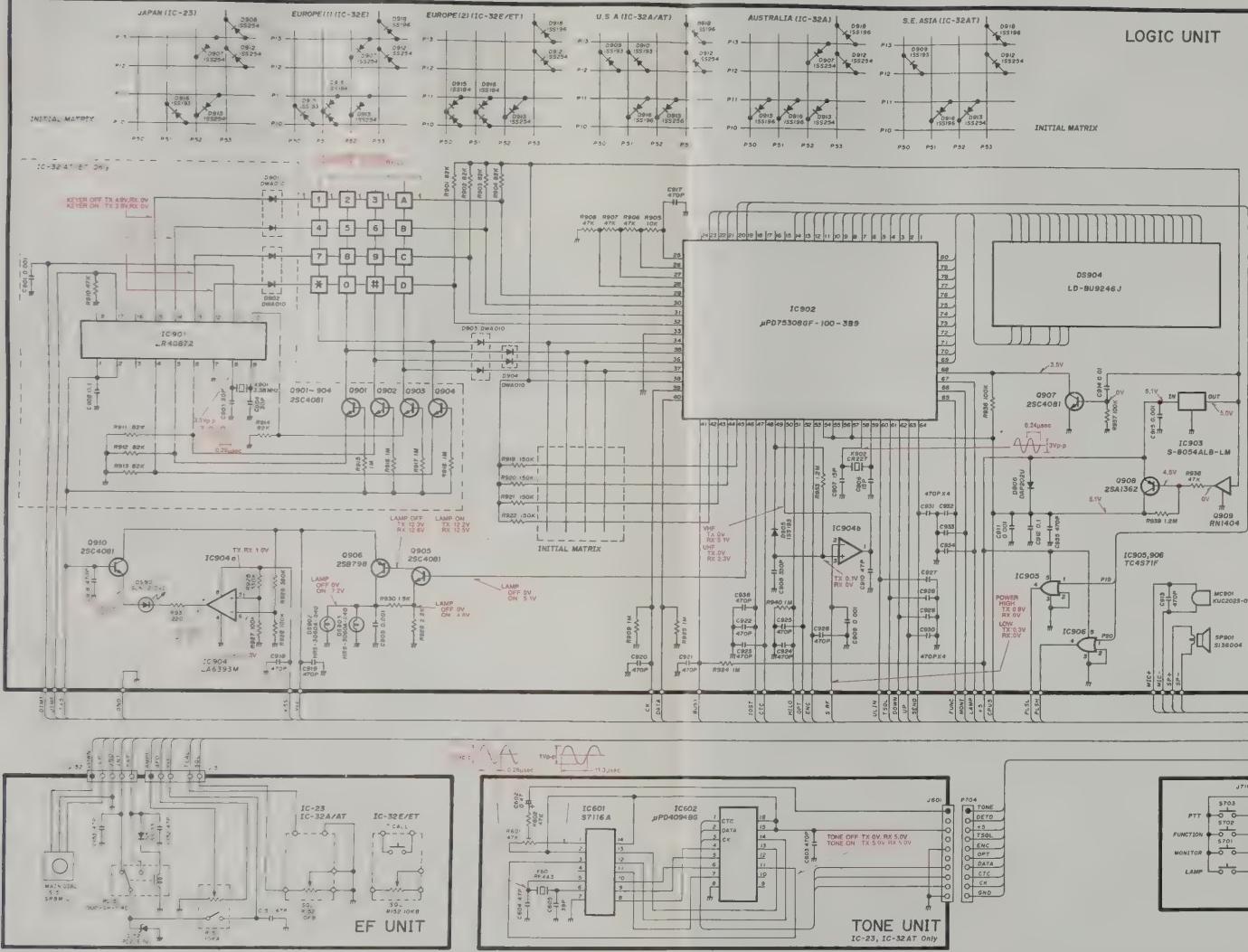
[T. SQL UNIT]

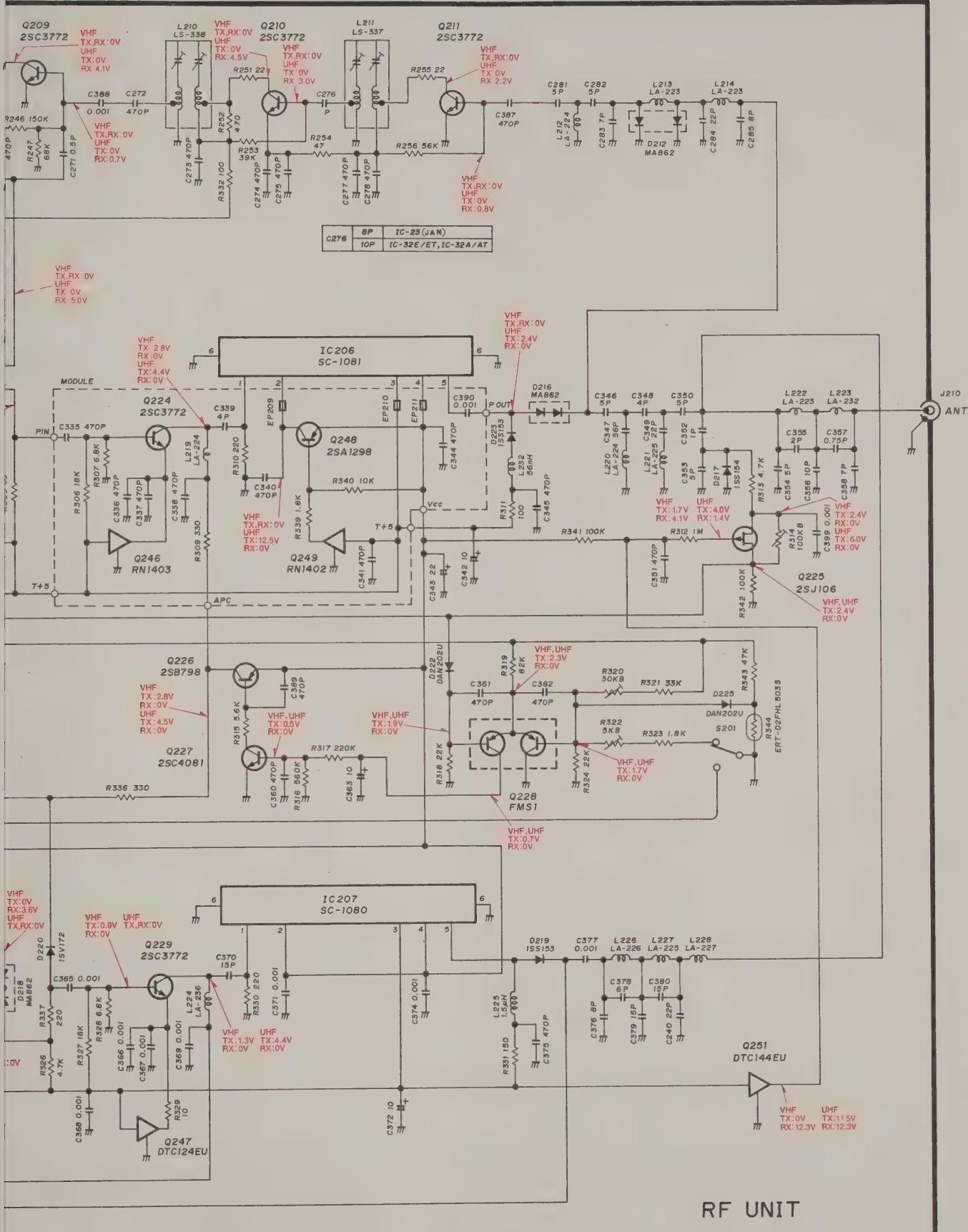
| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|-----------|
| IC1 | IC | MN6520 |
| IC2 | IC | μPD4094BG |
| IC3 | IC | TC4S81F |
| IC4 | IC | TC4S81F |
| Q1 | Transistor | DTA144EU |
| Q2 | Transistor | DTA144EU |
| Q3 | Transistor | DTC144EU |
| Q4 | Transistor | 2SC4081 R |
| D1 | Diode | DA204U |
| D2 | Diode | 1SS193 |
| X1 | Crystal | CR245 |
| R1 | Resistor | 10 kΩ |
| R2 | Resistor | 15 kΩ |
| R3 | Resistor | 150 kΩ |
| R4 | Resistor | 2.2 kΩ |
| R5 | Resistor | 10 kΩ |
| R6 | Resistor | 10 kΩ |
| R7 | Resistor | 100 kΩ |
| R8 | Resistor | 47 kΩ |

| REF. NO. | DESCRIPTION | PART NO. |
|----------|-------------|----------|
| R9 | Resistor | 22 kΩ |
| R10 | Trimmer | 22 kΩ |
| R11 | Resistor | 100 kΩ |
| R12 | Resistor | 100 kΩ |
| R13 | Resistor | 1 MΩ |
| R14 | Resistor | 4.7 kΩ |
| R15 | Resistor | 2.2 MΩ |
| C1 | Ceramic | 0.1 μF |
| C2 | Ceramic | 0.1 μF |
| C3 | Ceramic | 50 μF |
| C4 | Ceramic | 50 μF |
| C5 | Tantalum | 33 μF |
| C6 | Ceramic | 50 μF |
| C7 | Ceramic | 0.1 μF |
| C8 | Ceramic | 0.1 μF |
| C9 | Ceramic | 0.1 μF |
| J1 | Connector | PI28A10M |
| EP1 | P.C. Board | B-1577C |

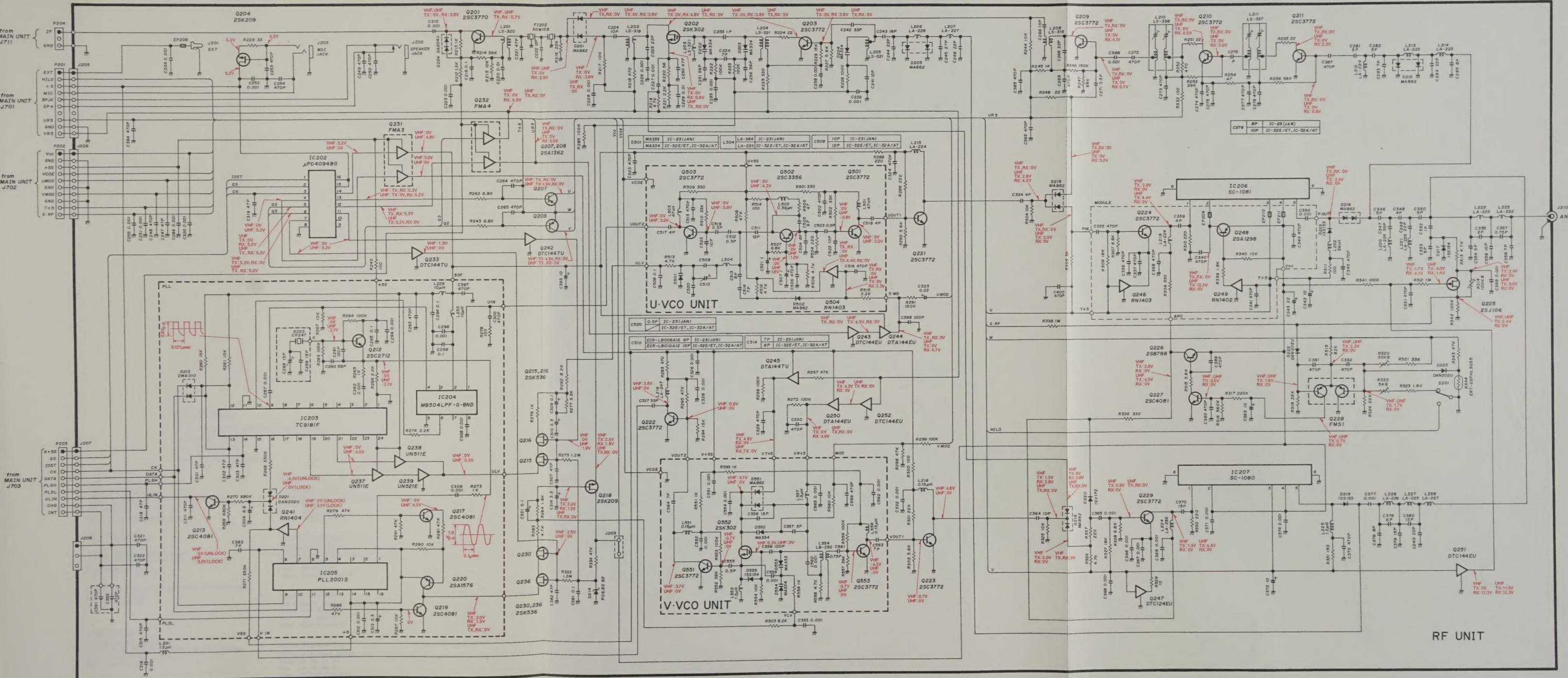
SECTION 10 VOLTAGE DIAGRAMS

LOGIC AND MAIN UNITS





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